

Options to Enhance the Corridor

How can Kenilworth Avenue be transformed to function better as a roadway and be an asset to the surrounding neighborhoods?

Sections 3.1, 3.2 and 3.3 of this chapter describes three options that were explored to address this question.

Section 3.4 discusses how each option would affect the transportation system in the corridor and recommends a preferred option. Section 3.5 provides more detailed discussion of the preferred option.

In addition, this chapter discusses two potential connections within the study area that are aimed to improve connectivity across the Anacostia River: a new crossing aligned with Massachusetts Avenue, and a new River Road. Several options that explore alternative connections for Massachusetts Avenue and River Road are discussed in Section 3.6.

Three Options to Enhance the Kenilworth Avenue Corridor



Example of a Boulevard



Example of a Four-Lane Limited Access Roadway



Example of Kenilworth Avenue Depressed

Option 1 Kenilworth Avenue as a Boulevard

This option explores transforming Kenilworth Avenue from a freeway to a Boulevard between East Capitol Street and Eastern Avenue. South of East Capitol Street, Kenilworth Avenue remains a freeway with enhancements to its appearance and infrastructure.

Option 2 Kenilworth Avenue as a Four-Lane, Limited Access Roadway

This option explores maintaining Kenilworth Avenue as a limited access roadway, but with a reduced footprint north of East Capitol Street: four lanes (two in each direction) versus the six existing lanes (three in each direction). South of East Capitol Street, Kenilworth Avenue remains a freeway with enhancements to its appearance and infrastructure.

Option 3 Kenilworth Avenue with Improved Infrastructure

This option explores maintaining Kenilworth Avenue as freeway with enhancements to safety conditions, infrastructure and its appearance. This option also explores depressing portions of the corridor to improve connectivity across the roadway and between neighborhoods.

Additional Studies to Enhance Connectivity Across the Anacostia River Areas



Illustration of Massachusetts Avenue Crossing



Example of Park Road

Massachusetts Avenue Crossing

Three options for a new Anacostia River crossing, aligned with Massachusetts Avenue, are explored:

- Vehicular bridge between Reservation 13 and Randle Circle,
- Pedestrian and bicycle bridge between waterfront parks, and
- Vehicular bridge between waterfront parks.

Park Road

Three connections that would link waterfront parks on both sides of the river are explored:

- Anacostia Avenue to Eastern Avenue,
- Benning Road to Barney Circle, and
- Park Road bridge connection at Massachusetts Avenue.

3.1 Option No. 1 Kenilworth Avenue as a Boulevard

This concept explores transforming Kenilworth Avenue into a tree-lined boulevard street with two distinct segments, as described below and illustrated in Figure 3.1.

Pennsylvania Avenue to East Capitol Street

Between Pennsylvania Avenue and East Capitol Street, the corridor remains a four-lane roadway as it is today; however, the appearance of the corridor is improved through the introduction of a landscaped median, and

replacement of the paved shoulders with reinforced grass shoulders (as illustrated in Figure 3.3).

In this option, as well as in Options 2 and 3, a portion of Kenilworth Avenue, to the south of East Capitol Street, could be realigned to the east to provide additional parkland adjacent to the river.

East Capitol Street to Eastern Avenue

Between East Capitol Street and Eastern Avenue, the corridor is transformed into a boulevard where the existing service roads are removed, and the roadway cross-section is widened to add tree-lined shoulders and a tree-lined landscaped median. Owing to the large volume of traffic on Kenilworth Avenue north of East Capitol Street, eight lanes of traffic, four in each direction, are provided (see Figures 3.2 and 3.4).



Example of a Boulevard

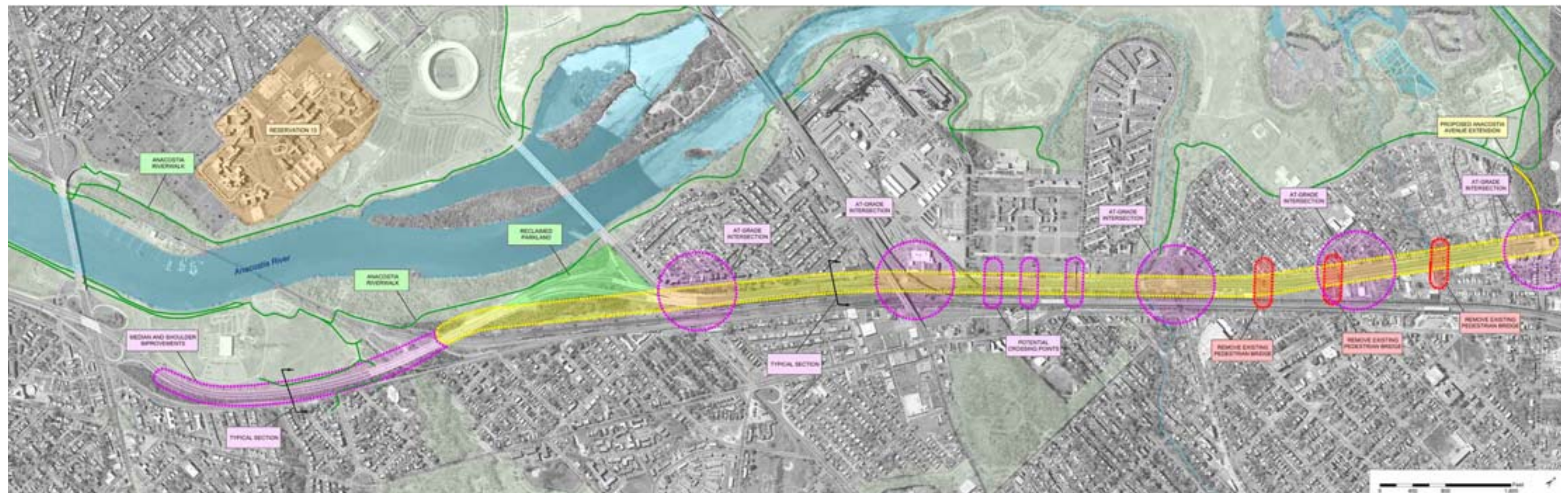


Figure 3.1: Option 1 - Transforming Kenilworth Avenue into a Boulevard

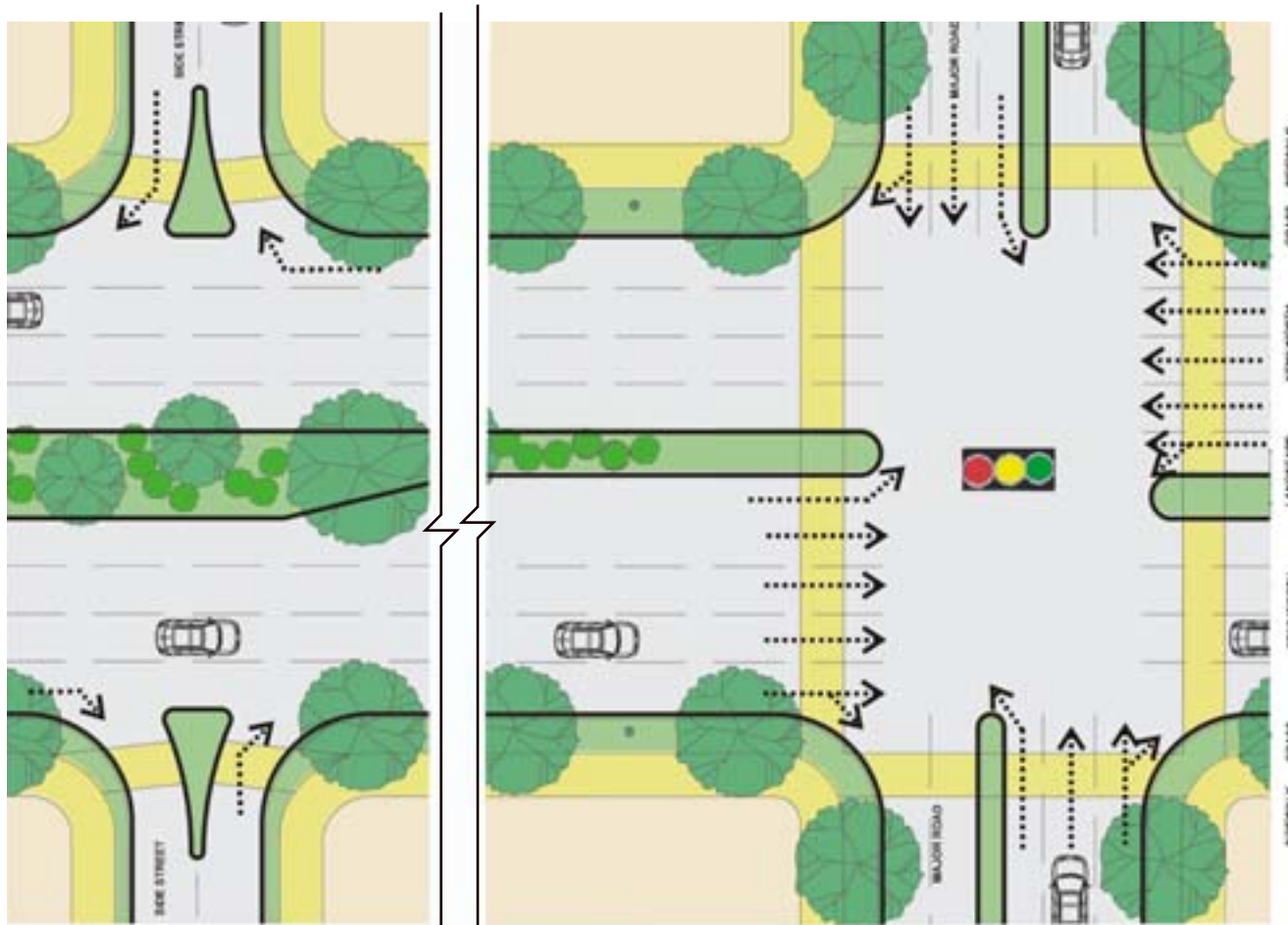


Figure 3.2: Typical Plan for a boulevard (tree-lined shoulders and median)

Existing Interchanges

The interchanges at East Capitol Street, Benning Road, Nannie Helen Burroughs Avenue and Eastern Avenue function as follows:

- East Capitol Street: Through-traffic on East Capitol Street remains below grade as it is today. A new signalized, at-grade intersection west of Kenilworth Avenue allows traffic on Kenilworth Avenue full access to East Capitol Street.
- Benning Road: At Benning Road, through traffic to Minnesota Avenue remains elevated over Kenilworth Avenue and the railroad as it is today. The existing bridges, however, are divided to allow an at-grade intersection with Kenilworth Avenue to be built between them, improving conditions for pedestrians and bicyclists.

- Nannie Helen Burroughs Avenue: At Nannie Helen Burroughs Avenue, a new signalized at-grade intersection replaces the existing bridge. Nannie Helen Burroughs Avenue remains grade-separated at the intersection with the CSX Railroad tracks.
- Eastern Avenue: At Eastern Avenue, a new signalized, at-grade intersection replaces the existing bridge. A potential new pedestrian path connects the intersection with Anacostia Avenue, improving access to the Kenilworth Aquatic Gardens.

New Intersection

A new signalized intersection is introduced either at Ord Street or Nash Street, connecting to Olive Street near the Deanwood Metrorail station.

Between these signalized intersections, additional intersections could occur right-in and right-out turns (see Figure 3.2). To turn left onto Kenilworth Avenue from a local street, a driver would use a signalized intersection.

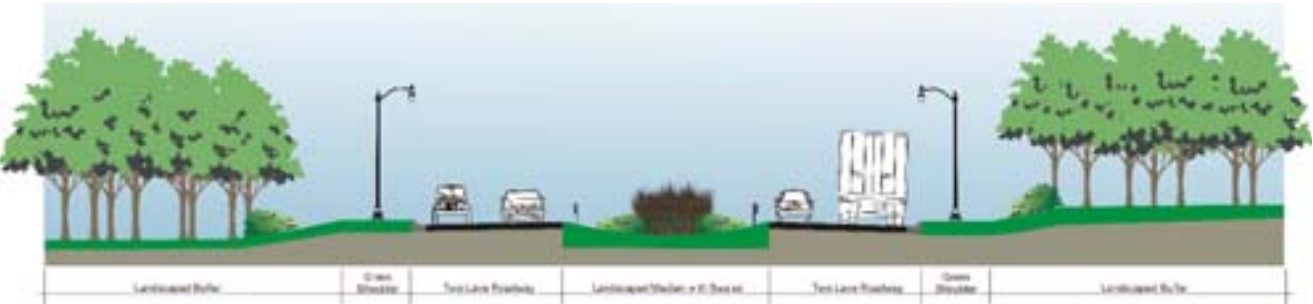


Figure 3.3: Typical Cross-Section Between Pennsylvania Avenue and East Capitol Street

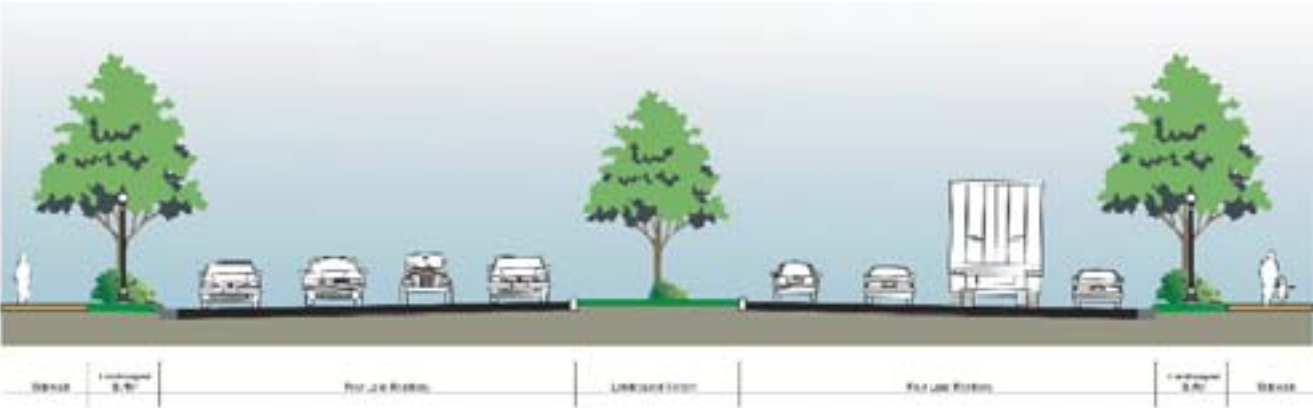


Figure 3.4: Typical Cross-Section Between East Capitol Street and Eastern Avenue

This concept explores transforming Kenilworth Avenue from a six-lane to a four-lane limited-access roadway with two distinct segments, as described below and illustrated in Figure 3.5.

Similar to Option 1, between Pennsylvania Avenue and East Capitol Street, the corridor remains a four-lane roadway. The corridor's appearance is improved through the introduction of a landscaped median, and replacement of the paved shoulders with reinforced grass shoulders (as illustrated in Figure 3.7). In this option, as well as in Options 1 and 3, a portion of Kenilworth Avenue, to the south of East Capitol Street, could be realigned to the east to provide additional parkland adjacent to the river.

Between East Capitol Street and Eastern Avenue, Kenilworth Avenue is reduced to four lanes (two in each direction) versus the six lanes (three in each direction) that currently exist. These improvements are aimed to increase safety, provide traffic calming, and add landscaping to enhance the corridor's visibility (see Figure 3.6).

Between East Capitol Street and Benning Road, in addition to the proposed four through lanes, an acceleration-deceleration lane is provided in each direction to accommodate traffic to and from the East Capitol Street interchange.



Example of a Four-Lane Limited Access Roadway

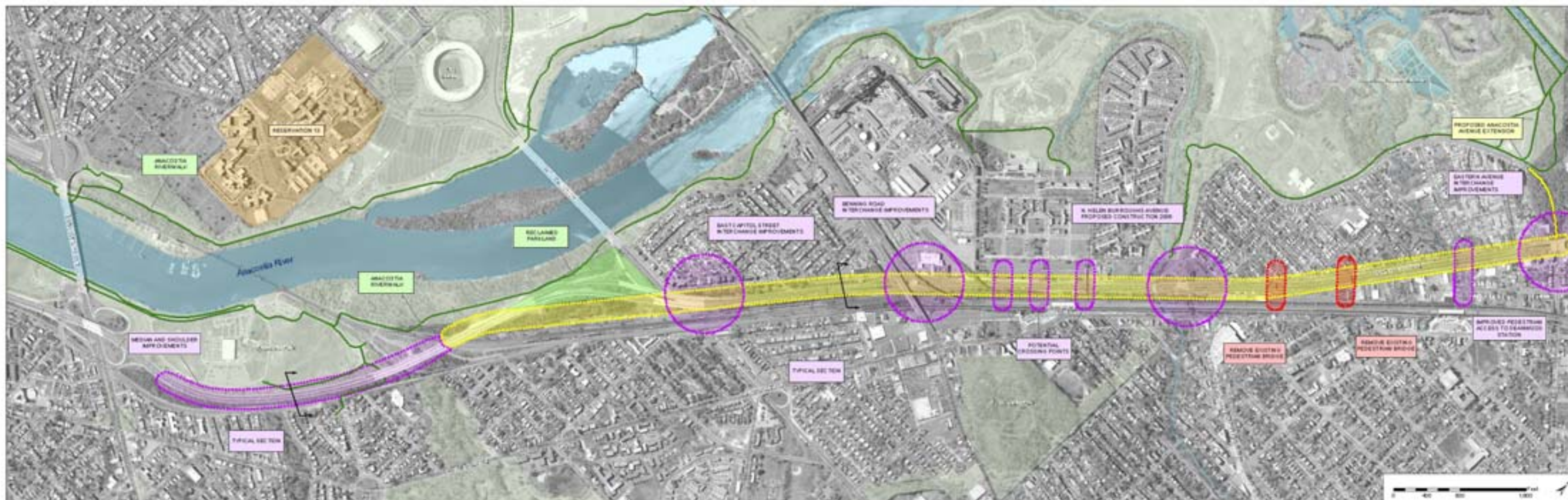


Figure 3.5: Option 2 - Transform Kenilworth Avenue from a six-lane to a four-lane limited-access roadway

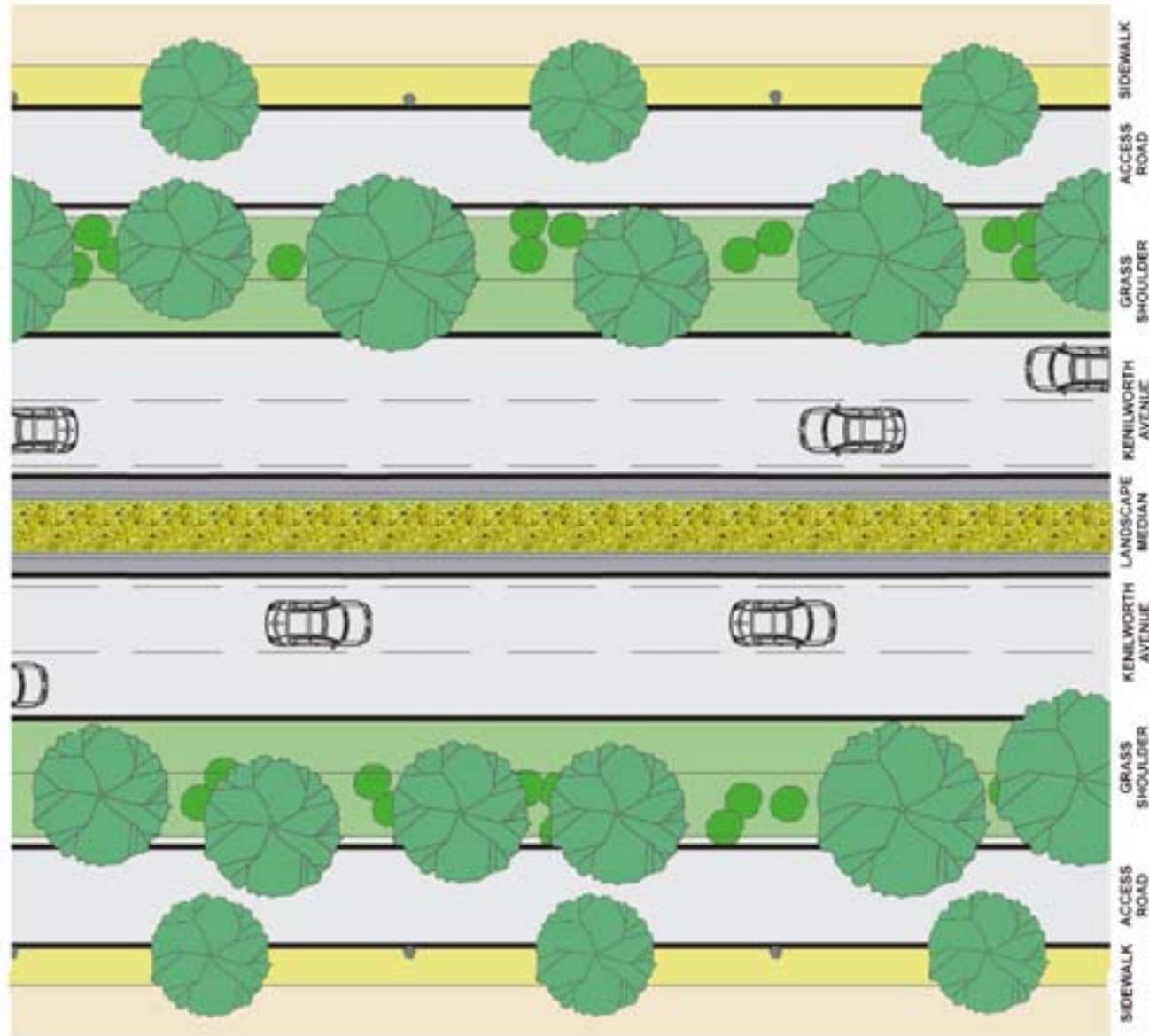


Figure 3.6: Typical Plan for a four-lane roadway (landscaped medians and reinforced green shoulders)

The on- and off-ramps north of Nannie Helen Burroughs Avenue are either eliminated or consolidated. The service roads north of Nannie Helen Burroughs Avenue are made narrower and curb extensions are added to delineate parking areas and to provide refuge for pedestrians crossing the street.

The reduced roadway cross-section provides space for a wider, landscaped median and additional green space between Kenilworth Avenue and the service roads (see Figure 3.8).

Under this option, the existing pedestrian bridges at Hayes Street leading to the Minnesota Avenue Metrorail Station and at Douglas Street leading to the Deanwood Metrorail Station are upgraded and improved. The pedestrian bridges at Lane Place and Nash Street are removed.

Existing Interchanges

The interchanges at East Capitol Street, Benning Road, Nannie Helen Burroughs Avenue and Eastern Avenue function are reconstructed as described under Section 3.4.

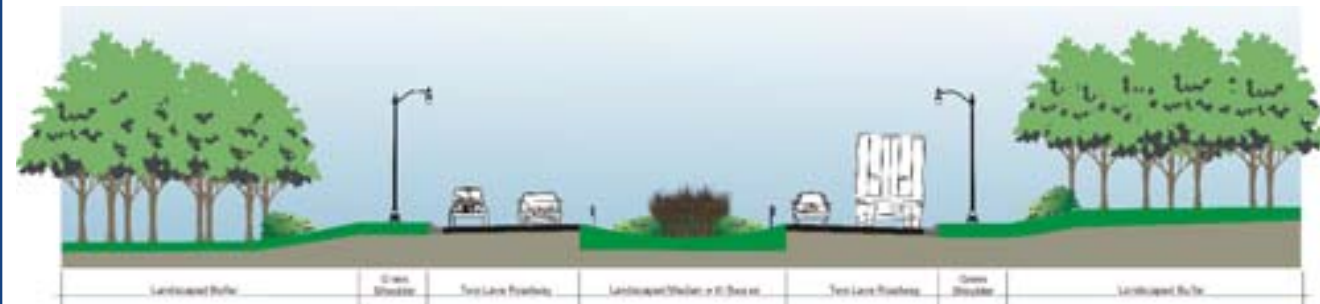


Figure 3.7: Typical Cross-Section Between Pennsylvania Avenue and East Capitol Street (landscaped median and reinforced grass shoulders)



Figure 3.8: Typical Cross-Section Between East Capitol Street and Eastern Avenue (Four-lane roadway with landscaped median and reinforced grass shoulders)

3.3 Option No. 3 – Kenilworth Avenue with Improved Infrastructure

This option explores maintaining Kenilworth Avenue as freeway with enhancements to safety conditions, infrastructure and its appearance. This option also explores depressing portions of the corridor to improve connectivity across the roadway and between neighborhoods. Infrastructure improvements are made in two distinct segments, as described below and illustrated in Figure 3.9:

Pennsylvania Avenue to East Capitol Street

Similar to Options 1 and 2, between Pennsylvania Avenue and East Capitol Street, the corridor remains a four-lane roadway. The corridor's appearance is improved through the introduction of a landscaped median, and

replacement of the paved shoulders with reinforced grass shoulders (as illustrated in Figure 3.11). In this option, as well as in Options 1 and 2, a portion of Kenilworth Avenue, to the south of East Capitol Street, could be realigned to the east to provide additional parkland adjacent to the river.

East Capitol Street to Eastern Avenue

Between East Capitol Street and Eastern Avenue, the existing infrastructure is improved and portions of Kenilworth Avenue are depressed to create opportunities for local street connections between neighborhoods on either side (see Figure 3.12). Six lanes of traffic, three in each direction, are maintained (as it is

today); however, the existing on- and off-ramps are either eliminated or consolidated.

In this option, the service roads on either side of Kenilworth Avenue remain, but mostly function as local roads between the neighborhoods. This option includes upgrading the two existing pedestrian bridges at Hayes Street (leading to Minnesota Avenue Metrorail Station) and at Douglas Street (leading to the Deanwood Metrorail Station). The pedestrian bridge at Lane Place and Nash Street are removed.



Example of a Kenilworth Avenue Depressed

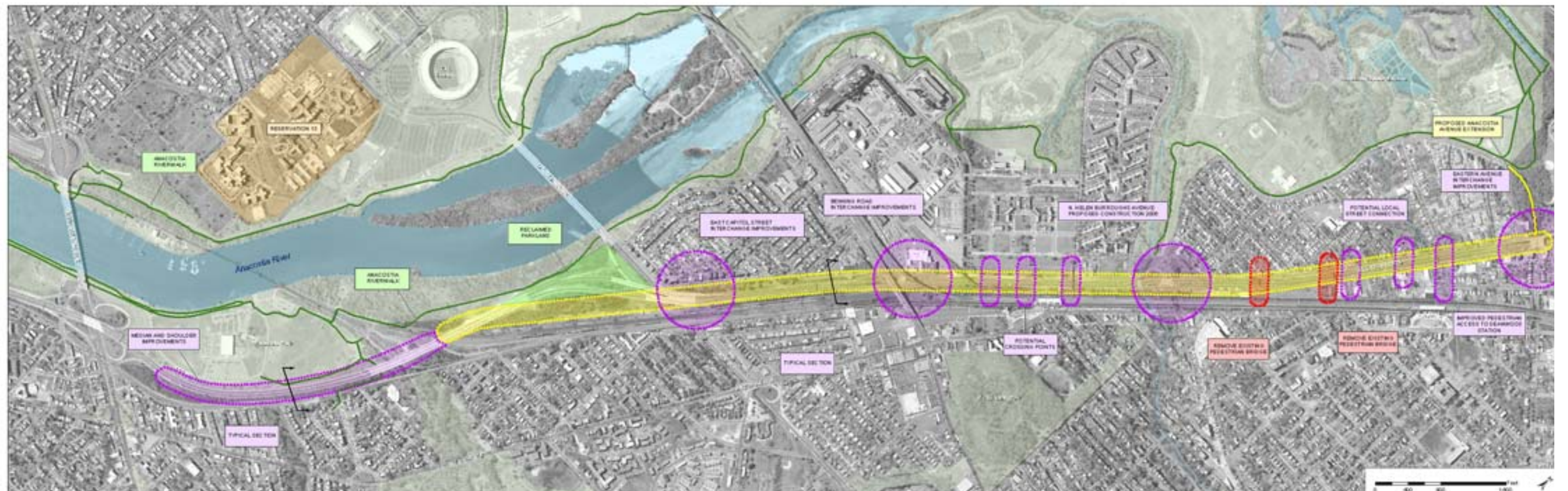


Figure 3.9: Option 3 - Maintain Kenilworth Avenue as a freeway with enhancements and depressing portions to allow connections across the corridor.

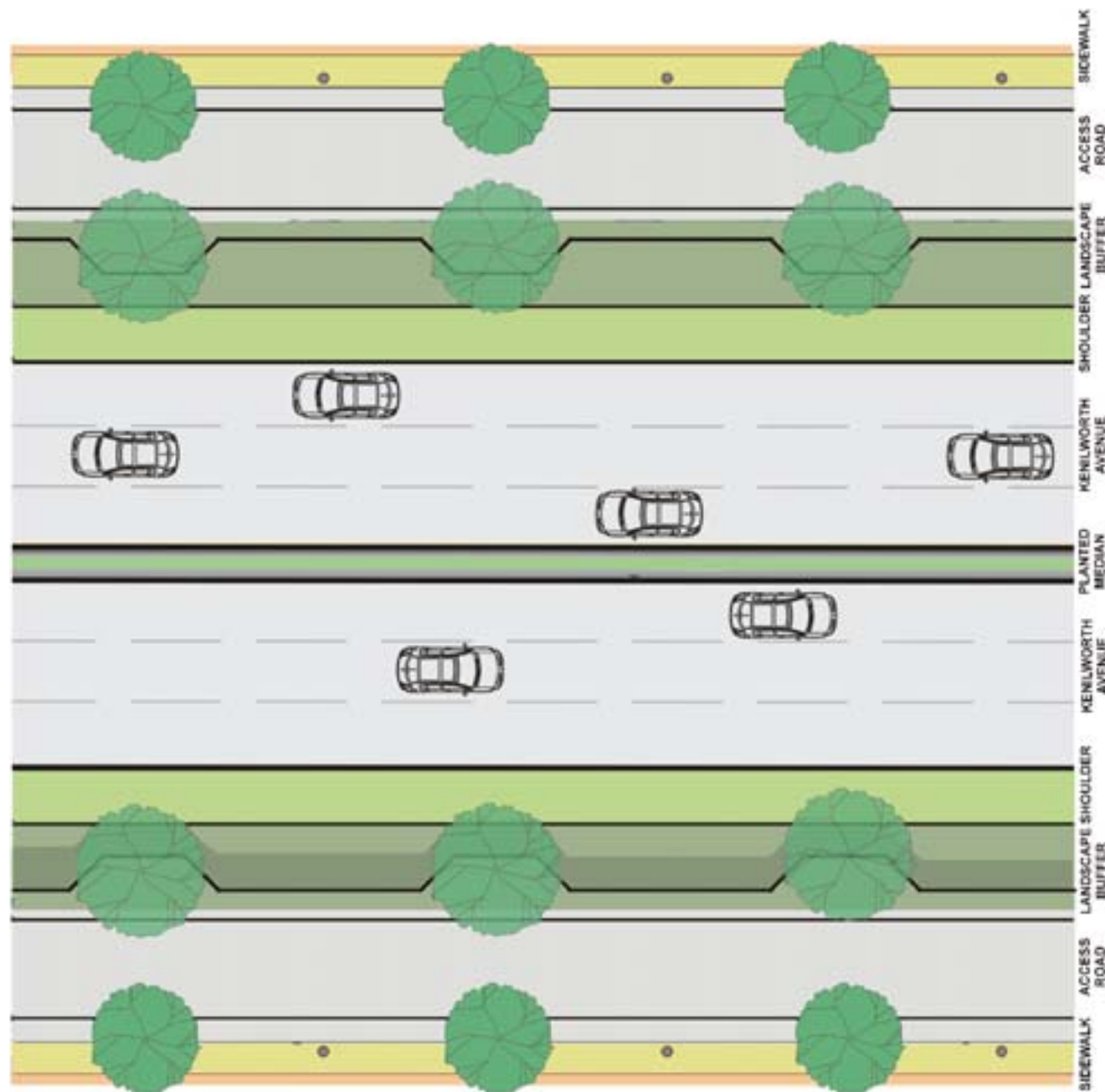


Figure 3.10: Typical Plan (Option 3 - Depressing portions of Kenilworth Avenue)

Existing Interchanges

The interchanges at East Capitol Street, Benning Road, Nannie Helen Burroughs Avenue and Eastern Avenue are reconstructed as described under Section 3.4.

New Connections

Lowering Kenilworth Avenue allows for a new vehicular, pedestrian, and bicycle crossing at either Ord Street or Nash Street, permitting the removal of two existing pedestrian bridges immediately south of Ord Street, and improving access to the Deanwood Metrorail Station.

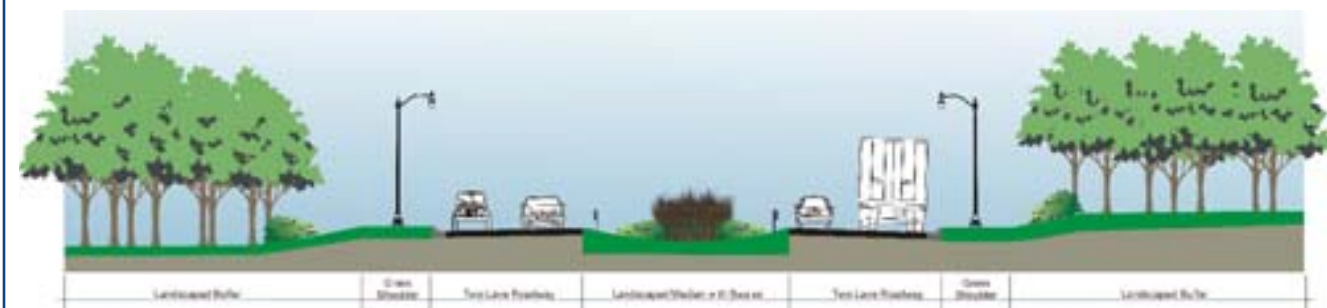


Figure 3.11: Typical Cross-Section Between Pennsylvania Avenue and East Capitol Street



Figure 3.12: Cross-Section Between East Capitol Street and Eastern Avenue (Kenilworth Avenue depressed to provide new connection)

3.4 Screening Analysis of Options 1, 2 and 3

An analysis of existing and future conditions was performed for each of the options. This evaluation of the mainline portion of Kenilworth Avenue was completed independent of individual intersections along the corridor. Each option was first tested with year 2004 traffic volumes. Next, future year 2030 traffic volumes were developed and each option was evaluated using those projections.

Summary of Analysis

This corridor study first evaluated existing conditions using Year 2004 volumes. A Synchro model was developed for the corridor and calibrated with field-observed travel times. An examination of the three options with year 2004 traffic volumes indicated:

- **Option 1** is not feasible due to potential queuing and unacceptable LOS; therefore, it was eliminated from further consideration.
- **Option 2** is feasible to implement in the near-term; this option would improve current safety issues but will impact traffic operations. This option is not feasible following improvements along southbound MD 295 in Maryland, which will shift congestion from the north into the study area.
- **Option 3** was found to be feasible and was considered for year 2030.

3.4.1 Overview of Analysis

The three mainline options described in Sections 3.1, 3.2 and 3.3 were first evaluated using Year 2004 traffic data.

Analysis of Option 1 - Boulevard

Option 1 was analyzed as a roadway with signalized intersections at East Capitol Street, Benning Road, Nannie Helen Burroughs Avenue and Eastern Avenue. This type of roadway is typically analyzed for a Level of Service (LOS) based on the traffic delay measured in seconds that occurs at each signal. To accomplish this, peak hour traffic

volumes under Option 1 were determined and an analysis was conducted using Synchro and SimTraffic.

Table 3.1 shows the results of the analysis at the four proposed intersections along Kenilworth Avenue. Under this option, with current traffic volumes, all of the signalized intersections would operate at LOS F.

SimTraffic was also used to determine north- and southbound travel times throughout the corridor. Under Option 1, average travel speeds are low throughout the corridor. During the AM peak hour, southbound vehicles average less than 12 mph between Eastern Avenue and East Capitol Street. In the PM peak hour, northbound vehicles typically travel slower than 15 mph. This is a significant degradation in travel time compared to existing conditions (see Figures 2.14 and 2.15).

The analysis also showed southbound queues on Kenilworth Avenue extending over one mile into Maryland during the AM peak hour. These queues would impact the operations not only at the Baltimore-Washington Parkway, MD 201, and US 50 interchange, but adjacent interchanges as well. PM peak hour queues are also long but do not extend to or beyond Pennsylvania Avenue.

Option 1 creates a section of highway with traffic signals between two freeway sections. This generates safety hazards as vehicles at either end of the study area enter a lower-speed roadway with queued vehicles at freeway speed.

Even though Option 1 provides for pedestrian movements at the four intersections considered, the width of Kenilworth Avenue under this option has to be more than 100 feet because of the number of lanes required to carry the traffic volumes. To cross Kenilworth Avenue, pedestrians must seek refuge on the median and most likely need two traffic signal cycles to complete the crossing.

Intersection	AM Peak Hour		PM Peak Hour	
	LOS	Delay	LOS	Delay
East Capitol Street	F	204	F	254
Benning Road	F	214	F	230
Nannie Helen Burroughs Avenue	F	367	F	374
Eastern Avenue	F	354	F	726
Note: Delay measured in seconds.				

Table 3.1: Intersection LOS Analysis for Option 1

Improvement Scenario	AM Peak Hour		PM Peak Hour	
	Southbound	Northbound	Southbound	Northbound
Existing 2004 Condition	360	312	349	502
Option 2 + Scenario 1	1,051	342	424	1,088
Option 2 + Scenario 2	1,440	330	586	1,000
Option 2 + Scenario 3	1,099	341	401	1,023
Option 2 + Scenario 4	1,478	339	591	1,007
Note: Travel Times measured in seconds.				

Table 3.2: Travel Times for Option 2 under the Four Scenarios

Analysis of Option 2 - A Four-Lane Avenue

Under Option 2, Kenilworth Avenue functions much as it does today, as a limited access freeway with interchanges at East Capitol Street, Benning Road, Nannie Helen Burroughs Avenue and Eastern Avenue. The analysis for this type of roadway is very different than that performed for the signalized roadway analyzed under Option 1. For freeways, travel times and speeds, combined with the capacity of the freeway measured by the density of vehicles in the travel lanes, are used to measure effectiveness.

Because Option 2 reduces the number of through lanes on Kenilworth Avenue north of East Capitol Street, and because of the large volume of traffic that enters and leaves the study area at the Maryland state line, it was important for the analysis to take into consideration the improvements proposed by the Maryland State Highway Administration immediately north of Eastern Avenue.

These improvements, the reconstruction of the Kenilworth Avenue bridge over AMTRAK and

Beaver Creek, will have an affect on the flow of vehicles along the freeway. SimTraffic was used to determine travel times through the corridor for four scenarios, all related to the proposed improvements. These scenarios are:

- Scenario 1: the proposed SHA improvements are not implemented;
- Scenario 2: the proposed SHA improvements are implemented as planned;
- Scenario 3: the proposed SHA improvements are not implemented; however, improvements are made to the northbound Kenilworth Avenue ramp to eastbound US 50; and
- Scenario 4: the proposed SHA improvements and improvements to the northbound Kenilworth Avenue ramp to eastbound US 50 are implemented.

The results of the SimTraffic analysis for Option 2 and the different scenarios are shown in Table 3.2. The travel time shown is the time required to travel Kenilworth Avenue

between US 50 and Pennsylvania Avenue in either the southbound or northbound direction.

Under all scenarios, travel time in the peak direction (southbound in the AM peak hour and northbound in the PM peak hour) is increased considerably when compared to existing conditions. In the non-peak direction, there is little or no impact on travel times.

Typically, in the AM peak hour, southbound travel speeds are low at the north end of the corridor (beginning at US 50 in Maryland) and increase as vehicles travel south along the corridor. South of East Capitol Street, speeds return to existing averages which can be expected as Kenilworth Avenue south of East Capitol Street has two lanes and a significant number of vehicles exit at Benning Road and East Capitol Street.

The analysis shows that the proposed improvements by SHA to the southbound Kenilworth Avenue ramp from eastbound US 50 (Scenario 2) cause the greatest increase in congestion and travel time along Kenilworth Avenue. These impacts to traffic extend as far south as Nannie Helen Burroughs Avenue before dissipating.

During the PM peak hour, travel times north of East Capitol Street increase under all scenarios, although the deterioration is not as significant as experienced by southbound traffic in the AM peak hour.

With the improvement assumed in Scenarios 3 and 4, speeds are still slow entering the corridor from either direction; however, during the PM peak hour, speed and queuing improvements are observed in the northbound direction north of Nannie Helen Burroughs Avenue.

In general, Option 2 leads to a substantial increase in peak direction travel time in both the AM and PM peak hours, and a small travel time increase in the non-peak directions. A small improvement takes place if SHA improves the northbound Kenilworth Avenue exit ramp to eastbound US 50, as this move-



ment currently backs up from Maryland into Washington, DC.

The freeway LOS was also evaluated for Option 2. With the removal of a through-lane in both directions north of East Capitol Street, the majority of basic freeway, weaving and ramp segments operate at a LOS F.

Given the above analysis, Option 2 should only be considered for implementation after discussions with the Maryland State Highway Administration regarding their planned improvements.

NEAR-TERM IMPLEMENTATION OF OPTION 2

The planned re-construction of the Nannie Helen Burroughs Avenue interchange requires a long-term lane closure of Kenilworth Avenue in both directions. This provides an opportunity to evaluate whether or not Option 2 can be implemented as a near-term improvement through observation of real-time traffic conditions during reconstruction of the bridge. Conditions can then be compared to the modeled analysis described above.

As part of the reconstruction project, a Smart Work Zone is proposed. As part of the Smart Work Zone, portable data collection systems will collect speed, volume and lane occupancy information, which can be uploaded from the field via a cellular connection to a website that will summarize the raw data (by minute) as well as hourly data throughout the course of the project. An analysis of the data will determine queuing time and distance prior to the work zone in both the north- and south-bound directions.

The final recommendation as to whether Option 2 can be implemented is contingent upon the evaluation of traffic conditions resulting from the temporary lane closures at Nannie Helen Burroughs Avenue after analysis of the Smart Work Zone data.

The reconstruction of the Nannie Helen Burroughs Avenue interchange is being coordinated with the Maryland State Highway Administration’s project to reconstruct the

Improvement Scenario	AM Peak Hour		PM Peak Hour	
	Southbound	Northbound	Southbound	Northbound
Existing 2004 Condition	357	311	346	588
Option 3 + Scenario 1	675	311	428	917
Option 3 + Scenario 2	643	319	374	611

Note: Travel Times measured in seconds.

Table 3.3: Travel Times for Option 3 under the Two Scenarios

Beginning at	Ending at	Observed 2004 Volumes	Modeled 2004 Volumes	Volume Difference	Percent Difference
Pennsylvania Avenue	East Capitol Street	109,336	107,560	(1,776)	(1.6%)
East Capitol Street	Benning Road	122,147	122,863	716	0.6%
Benning Road	NHB Avenue	121,740	129,349	7,609	6.3%
NHB Avenue	Eastern Avenue	125,990	134,086	8,096	6.4%
Eastern Avenue	Maryland State Line	141,268	159,803	18,535	13.1%

Table 3.4: Kenilworth Avenue Traffic Characteristics by Segment

MD 201 (Kenilworth Avenue) bridge over the AMTRAK railroad in order to minimize construction activity.

Furthermore, Option 2 should not be considered suitable for year 2030 conditions.

Analysis of Option 3 - Improve Existing Infrastructure

The analysis methods for Option 3 are the same as those used for Option 2. Under Option 3, Kenilworth Avenue continues to function as a limited access freeway with interchanges at East Capitol Street, Benning Road, Nannie Helen Burroughs Avenue and Eastern Avenue and travel times and speeds, combined with the capacity of the freeway measured by the density of vehicles in the travel lanes, are used to measure effectiveness.

For Option 3, the improvements proposed by the Maryland State Highway Administration immediately north of Eastern Avenue are assumed implemented. SimTraffic was then

used to determine travel times through the corridor for two scenarios:

- Scenario 1: safety improvements are implemented along Kenilworth Avenue to consolidate the existing on- and off-ramps and improve acceleration and deceleration distances; and
- Scenario 2: the safety improvements in Scenario 1 are combined with improvements to the northbound Kenilworth Avenue ramp to eastbound US 50.

SimTraffic was used to determine travel times for Option 3 under both scenarios. The results are presented in Table 3.3 which shows the time required to travel Kenilworth Avenue between US 50 and Pennsylvania Avenue in either the southbound or northbound direction. In both scenarios, peak period average travel times for the north- and southbound directions increase, however, not as substantially as in Option 2. In the non-peak direction

there is little or no difference compared to existing conditions.

Under Option 2, improving the northbound Kenilworth Avenue to eastbound US 50 merging movement (Option 2, Scenario 3) did not result in significant operational advantages; however, under Option 3, this improvement (Option 3, Scenario 2) makes a significant improvement when compared to Option 3, Scenario 1 (see Table 3.3).

Option 3 results in a moderate increase in peak direction travel time during both peak hours. There is also a relatively small travel time increase in the non-peak directions during both peak hours.

3.5 Summary of Options

An analysis of the three options indicates that Option 1 should not be considered further for implementation. Unacceptable intersection LOS, queuing, and impacts to travel time throughout the corridor make it an unfeasible option.

The evaluation of Option 2, Scenario 1 or Option 2, Scenario 3 indicates that there would be an immediate improvement to safety within the corridor. However, this option under either scenario will have an adverse impact on peak period travel times. This option is only viable prior to the planned Maryland State Highway Administration’s implementing improvements to the bridge north of Eastern Avenue. After those improvements are made, under this option, there would be significant increases in congestion and travel times throughout the corridor.

Option 3, however, is a practical long-term improvement. Under this option, improvements planned by Maryland, together with safety improvements within the corridor, can be implemented. If northbound improvements at the ramp to eastbound US 50 are also built (Option 3, Scenario 2), there would be minimal impacts on travel times in the corridor.

The following section further develops this option and evaluates it and the No Build condition using projected 2030 traffic volumes.

3.6 Further Development of Option 3

The analysis of Option 3 for Year 2004 indicates that this option has the greatest potential for achieving the goals and objectives discussed in Chapter 1. With this in mind, further study and evaluation was undertaken that would help achieve the following objectives:

- Improve interchange connectivity to neighborhoods at key locations
- Improve functionality of key intersections
- Introduce parkway setting or parkway elements to the roadway corridor
- Introduce landscaped median and shoulders
- Upgrade quality of existing pedestrian crossings
- Introduce new crossings over or under Kenilworth Avenue
- Complete or close gaps at missing connections
- Create new connections to destinations points
- Create safe routes to existing transit stations/stops
- Improve functionality of service road on- and off-ramps

3.6.1 Interchange Concepts for Option 3

Under Options 3, the existing interchanges were studied to improve safety and access to adjoining neighborhoods for vehicular traffic, pedestrians and bicyclists. The interchanges that are proposed for improvement are:

- East Capitol Street;
- Benning Road; and
- Eastern Avenue.

Current plans to improve the Nannie Helen Burroughs Avenue interchange remain unchanged. A discussion of these improvements is included for information only; no other modifications were considered.

3.6.2 East Capitol Street Interchange

Five scenarios were developed for the East Capitol Street Interchange under Option 3. Each scenario provides varying degrees of improvements to safety, access to and from adjoining neighborhoods, and pedestrian and bicycle movements through the interchange and across Kenilworth Avenue.

Each scenario differs in cost. The more advanced scenarios provide the greatest benefits, require the greatest amount of new construction, and are the most expensive.

Each scenario includes variations to provide additional access to points east for south- and northbound Kenilworth Avenue traffic, and to points west for northbound Kenilworth Avenue traffic. Also explored are improvements that allow westbound traffic on East Capitol Street to go north or south on Kenilworth Avenue.

Scenarios EC-1, EC-2 and EC-3 maintain the existing Kenilworth Avenue alignment. Scenario EC-1 and EC-3 do not require modifying the existing bridges over East Capitol Street. EC-2 requires modifying the northbound bridge. Scenarios EC-4 and EC-5 require realignment of Kenilworth Avenue to the east to make it parallel to the CSX Railroad and recapture approximately 15 acres of open space.

Existing Conditions

The existing interchange is difficult to use. It only provides access from southbound Kenilworth Avenue to westbound East Capitol Street and from eastbound East Capitol Street to northbound or southbound Kenilworth Avenue. The interchange has excess pavement on northbound Kenilworth Avenue that was provided to accommodate a future connection to the Barney Circle Freeway, a connection that will not be built. The alignment of Kenilworth Avenue immediately south of East Capitol Street was also built westward to accommodate this future freeway connection, resulting in excess land isolated between the existing alignment and the CSX Railroad (see Figure 3.13).

As East Capitol Street passes beneath Kenilworth Avenue, the right-of-way narrows and there are no sidewalks for pedestrians or bicyclists; the passageway is like a concrete canyon that is oriented to automobiles. This canyon-like underpass extends past Minnesota Avenue.

Scenario EC-1

In this scenario, a new connection is made to allow traffic on westbound East Capitol Street to exit southbound and northbound onto Kenilworth Avenue by building a new connector just west of Kenilworth Avenue, perpendicular to East Capitol Street. This new connector intersects and crosses the existing exit ramp for eastbound East Capitol Street to northbound Kenilworth Avenue. After crossing the exit ramp, the new connector merges with the southbound ramp from eastbound East Capitol Street (see Figure 3.14).

This scenario requires the widening of East Capitol Street just west of Kenilworth Avenue to accommodate two left turn lanes onto the new connector. It also requires new traffic signals at the connector’s intersection with East Capitol Street and its intersection with the existing northbound exit ramp from eastbound East Capitol Street. Minor modifications are required to the existing southbound and northbound ramps to accommodate the new connector.

This scenario does not provide for full movement at the interchange. Northbound Kenilworth Avenue traffic would not have access to East Capitol Street and southbound Kenilworth Avenue traffic would only be able to exit to westbound East Capitol Street. No pedestrian or bicycle improvements are included in this scenario.

Scenario EC-2

This scenario is similar to Scenario EC-1; however, three additional movements are provided: southbound Kenilworth Avenue to eastbound East Capitol Street, and northbound Kenilworth Avenue to east- and westbound East Capitol Street.

To achieve this, a new northbound ramp for Kenilworth Avenue is constructed between the existing bridge over East Capitol Street and

the CSX Railroad bridge. At the base of the ramp, traffic is permitted to turn left (westbound) or right (eastbound) onto East Capitol Street. The new ramp requires modifying the existing bridge and removing the excess pavement along the eastern edge of Kenilworth Avenue (see Figure 3.15). It also requires lowering approximately 1,100 feet of a 15 foot by 10 foot storm sewer on the south side of East Capitol Street.

To connect southbound Kenilworth Avenue to eastbound East Capitol Street, a new ramp is built to connect the existing southbound ramp to westbound East Capitol Street. At the base of the ramp, traffic is permitted to turn left (eastbound) onto East Capitol Street.

In addition to the two new signals required for the new connector as under Scenario EC-1, this scenario requires signals at the base of the two new ramps from Kenilworth Avenue where they intersect East Capitol Street. This scenario may require modifying the existing abutments to gain additional sight distance for traffic using the new ramps. It may also require taking right-of-way from CSX Railroad to accommodate the new northbound ramp.

This scenario allows full movement at this interchange; however, no pedestrian or bicycle improvements are included.

Scenario EC-3

This scenario is a variation on Scenario EC-2. Instead of building a new northbound ramp allowing a right exit to East Capitol Street, this scenario has a left exit ramp from northbound Kenilworth Avenue that passes underneath southbound Kenilworth Avenue to the new connector for westbound traffic on East Capitol Street (see Figure 3.16).

Under this scenario, the new connector ramp is a two-way road with a four-leg intersection at the northbound ramp from eastbound East Capitol Street to northbound Kenilworth Avenue, and a T-intersection at East Capitol Street.

This scenario requires building a new bridge to allow the new northbound exit ramp to pass underneath southbound Kenilworth





Figure 3.13: Existing Conditions at the East Capitol Street Interchange



Figure 3.14: Scenario EC-1 (Completes all movement for traffic on East Capitol Street)



Figure 3.15: Scenario EC-2 (Permits full movement at the East Capitol Street interchange)



Figure 3.16: Scenario EC-3 (Permits full movement at the East Capitol Street interchange)

Avenue. Signal timing at the two new intersections will have to accommodate the new movements introduced by adding the northbound ramp.

This scenario allows for all vehicular movements; however, no pedestrian or bicycle improvements are included.

Scenario EC-4

This scenario involves a complete reconstruction of the existing interchange. Kenilworth Avenue is realigned and a new diamond interchange is constructed to replace the existing bridge (see Figure 3.17).

The new diamond interchange allows full movement in all directions for traffic on East Capitol Street and Kenilworth Avenue. As part of the reconstruction, East Capitol Street is widened and sidewalks and dedicated bicycle ways are added through the interchange.

Pedestrians and bicyclist are able to cross the on- and off-ramps to Kenilworth Avenue at

a perpendicular crossing, which improves safety and introduces a shorter and friendlier crossing experience (see Figure 3.17)

This scenario requires two new bridges carrying Kenilworth Avenue and the CSX Railroad over a widened East Capitol Street. It also requires relocating a storm sewer by approximately 1,500 feet along the south side of East Capitol Street. It requires new signals at the intersection of the on- and off-ramps to Kenilworth Avenue with East Capitol Street.

This scenario allows for all vehicular movements to occur and pedestrian and bicycle traffic to safely cross underneath Kenilworth Avenue and the CSX Railroad; a movement not possible today. The new alignment for Kenilworth Avenue creates approximately 15 acres of additional open space and parkland to the west of Kenilworth Avenue along the Anacostia River.



Figure 3.17: Scenario EC-4 (Provides for all traffic movements and for east and west pedestrian and bicycle movements beneath Kenilworth Avenue)



Figure 3.18: Scenario EC-5 (This SPUI scenario provides for all traffic movements and for east and west pedestrian and bicycle movements beneath Kenilworth Avenue)

Scenario EC-5

This scenario is similar to Scenario EC-4, but instead of a diamond interchange, a Single Point Urban Interchange (SPUI) is built. A SPUI handles turning movements differently from a diamond interchange. In a SPUI, opposing left turning movements (for example, east- and westbound East Capitol Street to north- and southbound Kenilworth Avenue, respectively) are allowed to occur simultaneously, whereas in a diamond interchange, they occur separately (see Figure 3.18).

A SPUI requires a longer bridge span across East Capitol Street to accommodate turning movements. This scenario allows for all vehicular movements to occur and pedestrian and bicycle traffic to safely cross underneath Kenilworth Avenue and the CSX Railroad, a movement not possible today. The new alignment for Kenilworth Avenue creates approximately 15 acres of additional open space and parkland to the west of Kenilworth Avenue along the Anacostia River.

3.6.3 Benning Road Interchange

Five scenarios for the Benning Road interchange are considered. All maintain through traffic to Minnesota Avenue on an elevated structure over Kenilworth Avenue and the CSX Railroad, as it is today. However, the various scenarios explore how southbound and northbound traffic on Kenilworth Avenue can access points to the east and west on Benning Road and how traffic on Benning Road can go north or south on Kenilworth Avenue.

Safety improvements at the intersection of Benning Road and Kenilworth Avenue and access improvements to River Terrace are important elements of each of these scenarios. Improvements to pedestrian and bicycle safety and movement are also explored since this is an important crossing point for non-vehicular traffic.

The existing vertical clearance between southbound Kenilworth Avenue and the at-grade Benning Road intersection with northbound Kenilworth Avenue is substandard; only 14'-3". The existing clearance for Benning Road over the CSX Railroad is 25'-0".

Existing conditions

The Benning Road-Kenilworth Avenue interchange is constrained by the CSX Railroad to the east of Kenilworth Avenue and the WMATA tracks on the north side of Benning Road. These constraints make it difficult to provide the southbound Kenilworth Avenue to eastbound Benning Road movement without taking property in the southwest quadrant. Further constraining this intersection are the CSX Railroad tracks connecting to the PEPCO power plant just north of the interchange (see Figure 3.19).



Figure 3.19: Benning Road Existing Conditions Along Kenilworth Avenue (below Benning Road Bridge)

The Benning Road interchange with Kenilworth Avenue is substandard in many respects. Movements are limited and those that do exist are unsafe given the volume of traffic that passes through the interchange. It is a three-level interchange as southbound Kenilworth Avenue is depressed lower than northbound Kenilworth Avenue to permit an at-grade intersection with traffic to and from Benning Road. Through traffic on Benning Road crosses over Kenilworth Avenue on a bridge high enough to provide adequate clearance not only for Kenilworth Avenue but also to clear the CSX Railroad to the east.

Southbound traffic on Kenilworth Avenue can exit to westbound Benning Road and also make use of a U-turn at the at-grade intersection to return to northbound Kenilworth Avenue. Eastbound traffic on Benning Road can exit to southbound Kenilworth Avenue or use the at-grade intersection to go northbound.

The intersection allows vehicles on northbound Kenilworth Avenue to exit to westbound Benning Road and eastbound traffic on Benning Road to exit to northbound Kenilworth Avenue. The exit and entrance ramps along northbound Kenilworth Avenue

are on the left side. There are often conflicts between vehicles exiting Kenilworth Avenue and those entering from Benning Road due to limited acceleration and deceleration distance.

Pedestrians are able to cross Kenilworth Avenue along the south side of the Benning Road bridge using a narrow sidewalk. To access the sidewalk, pedestrians must cross the non-signalized exit ramp from Benning Road to southbound Kenilworth Avenue. Many bicyclist use Benning Road to cross Kenilworth Avenue, typically within the travel lanes.

Scenario BR-1

This scenario improves the safety of the at-grade intersection of Benning Road and northbound Kenilworth Avenue by lengthening the exit ramp for northbound Kenilworth Avenue and providing a traffic signal.

The alignment of northbound Kenilworth Avenue is maintained as it is today; however, to accommodate the lengthened exit ramp, southbound Kenilworth Avenue is shifted to the west. This scenario requires that the existing bridge deck over southbound Kenilworth Avenue, which partially supports the at-grade intersection with northbound Kenilworth Avenue, be replaced (see Figure 3.20).

This concept does not add any new movements to the existing interchange, nor does it improve pedestrian and bicycle access to or across the Benning Road bridge.

Scenario BR-2

This scenario is similar to Scenario BR-1 except that a new connection is made between the southbound Kenilworth Avenue ramp to eastbound Benning Road and the westbound Benning Road ramp to southbound Kenilworth Avenue. This new connection allows southbound traffic coming from the Kenilworth Avenue service road to exit to southbound Kenilworth Avenue (see Figure 3.21). Currently, to make this movement, vehicles make an illegal U-turn on Benning Road at 34th Street to access the eastbound Benning Road ramp.

Two alignments for the service roads were considered. The first alignment squeezes the service road through the extension between the existing Benning Road bridge abutment and the existing southbound Kenilworth Avenue lanes. The second alignment is behind the bridge abutment. Both alignments require lowering the existing southbound lanes of Kenilworth Avenue by approximately eight feet to allow for the required vertical clearance between the service road and the existing Benning Road bridge.

This concept does not add any new movements to the existing interchange, nor does it improve pedestrian and bicycle access to or

across the Benning Road bridge. However, it does allow traffic on the southbound service road to access southbound Kenilworth Avenue.

Scenario BR-3

This scenario addresses some of the missing movements at Benning Road and Kenilworth Avenue. A new center-leg ramp connects Kenilworth Avenue and the Benning Road bridge, replacing the existing at-grade intersection. This new connection is situated south of the Benning Road bridge between the southbound and northbound lanes of Kenilworth Avenue. It allows traffic to exit from northbound Kenilworth Avenue to either east- or westbound Benning Road, and allows traffic traveling east- or westbound on Benning Road to exit to southbound Kenilworth Avenue (see Figure 3.22).

This scenario requires widening the Benning Road bridge to allow for the turning movements at the intersection of the new ramp with the existing bridge. It also requires realigning both the south- and northbound lanes of Kenilworth Avenue in order to accommodate the new ramp south of the bridge.

This scenario allows all movements except from southbound Kenilworth Avenue to eastbound Benning Road, and from westbound Benning Road to northbound Kenilworth Avenue. Minor improvements in pedestrian and bicycle access to or across the Benning Road Bridge are made as movements on some of the ramps on the west approach are moved to a signalized intersection on the bridge.

Scenario BR-4

This scenario focuses on improving safety for vehicular traffic, pedestrians, and bicyclists. The existing Benning Road bridge is rebuilt into two structures, one for eastbound and one for westbound traffic. The exit ramps to Kenilworth Avenue are realigned between the two bridges (see Figure 3.23). This allows pedestrian and bicycle traffic to move over Kenilworth Avenue between 34th Street and Minnesota Avenue on new sidewalks and an uninterrupted path with no need to cross exit ramps to Kenilworth Avenue as is the case today.

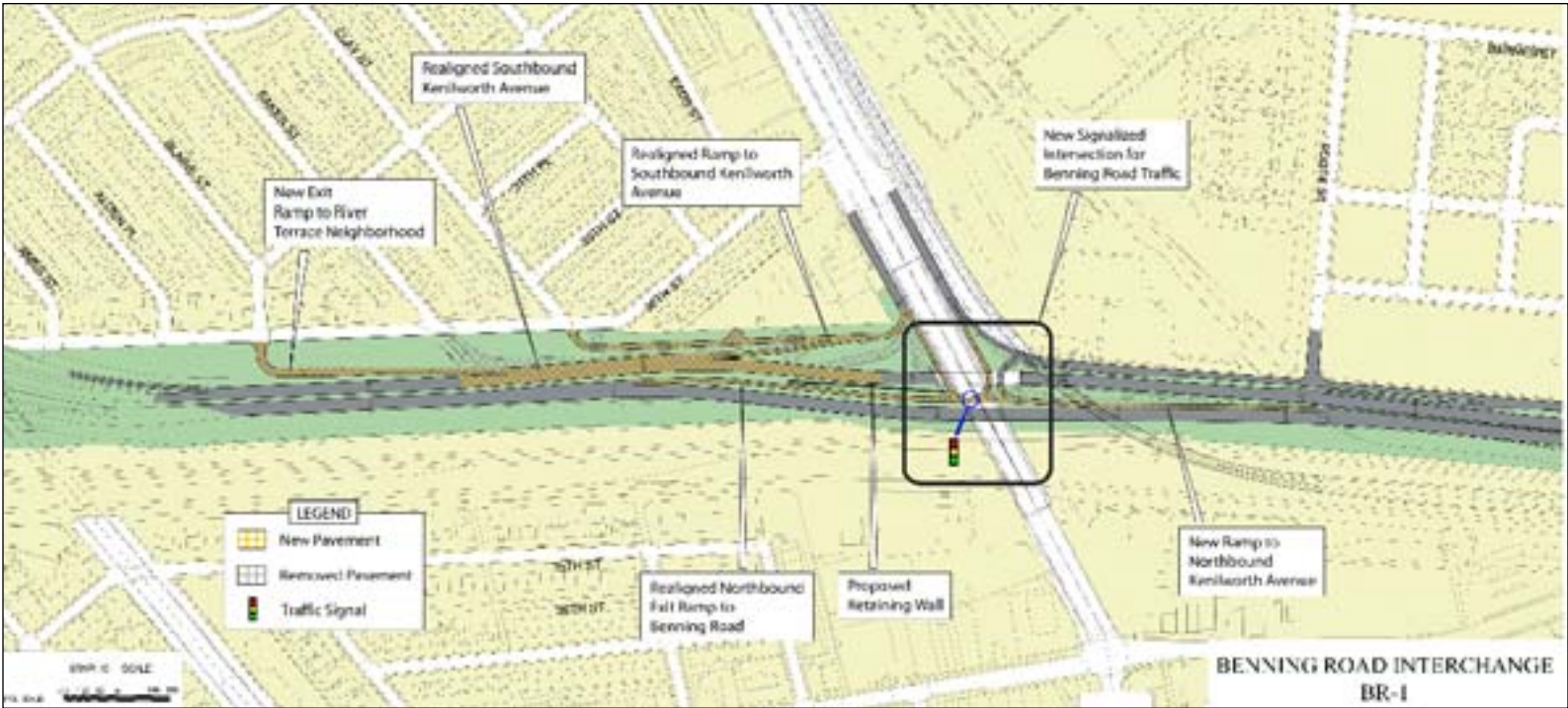


Figure 3.20: Scenario BR-1 (Provides for safety improvements at the eastbound Benning Road at-grade intersection with northbound Kenilworth Avenue)

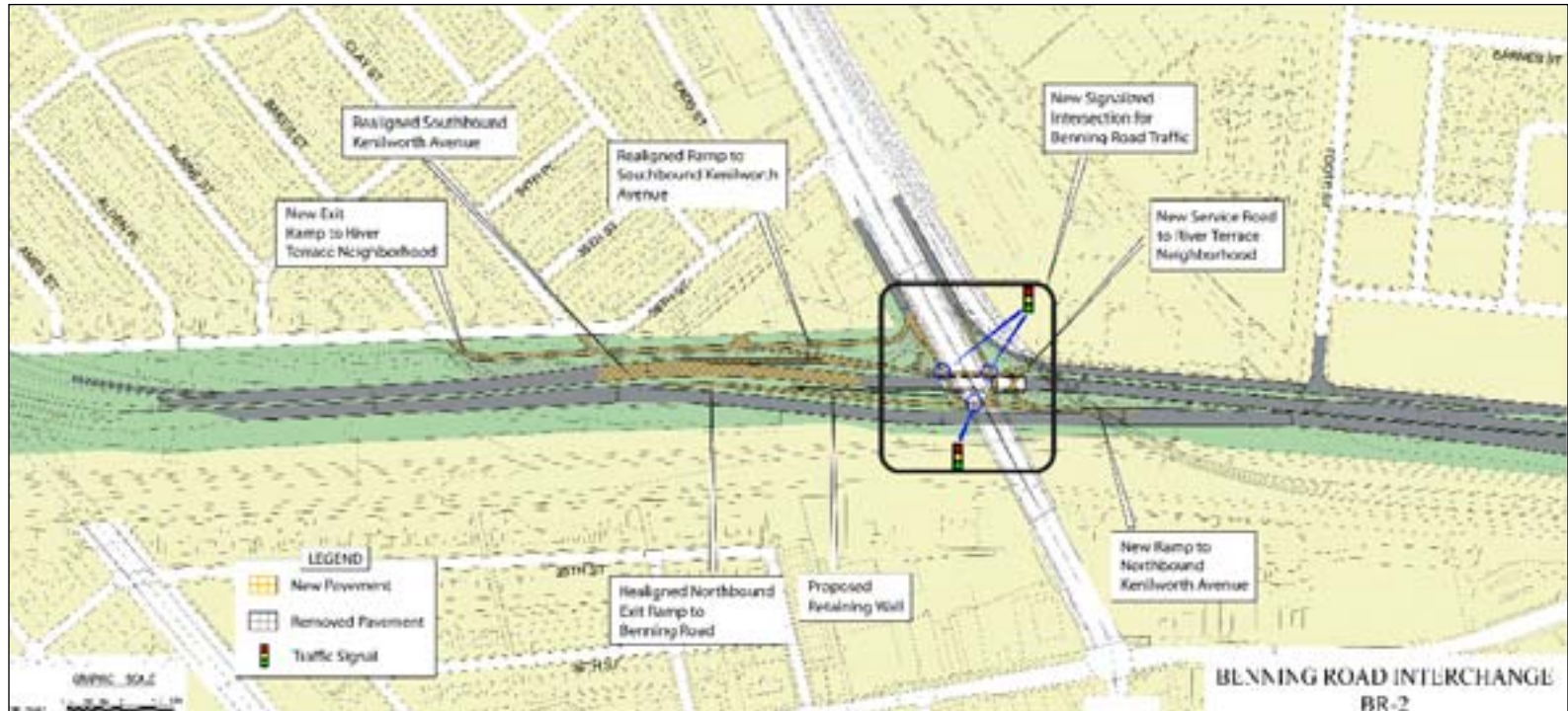


Figure 3.21: Scenario BR-2 (New connection from southbound Kenilworth Avenue to eastbound Benning Road, and westbound Benning Road to southbound Kenilworth Avenue)

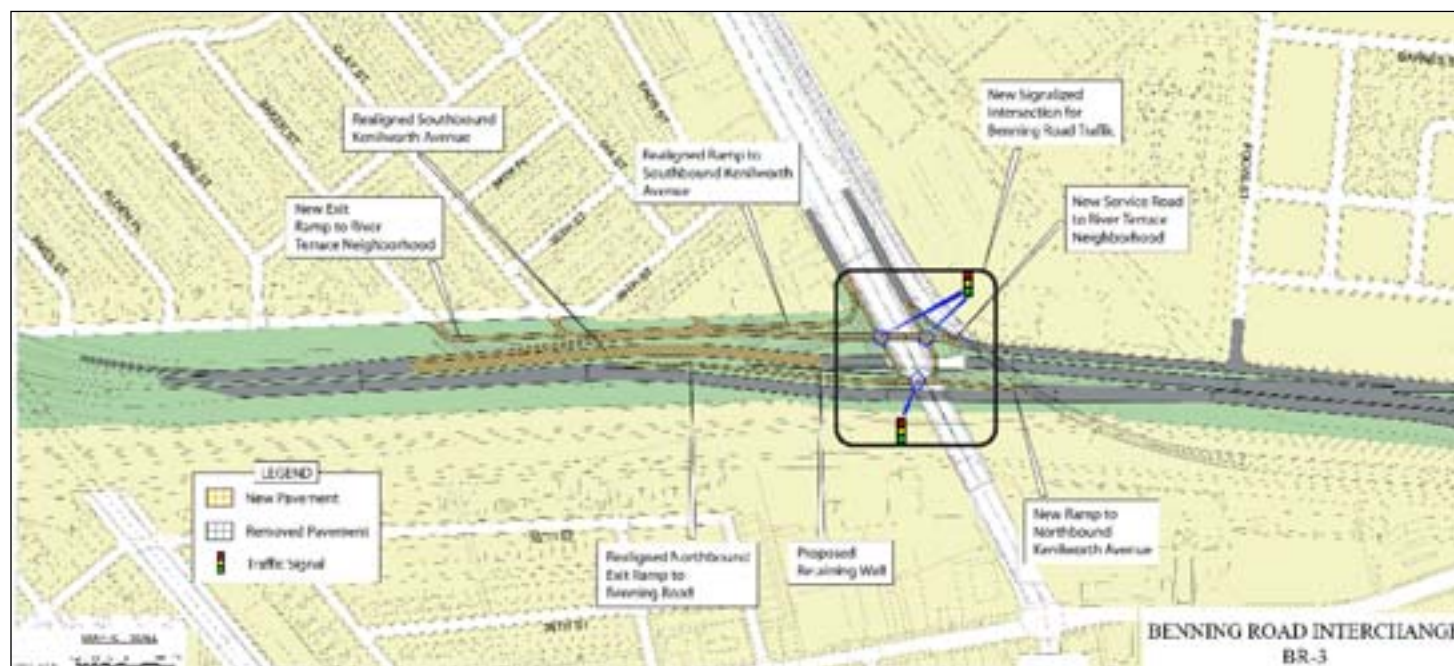


Figure 3.22: Scenario BR-3 (New center-leg ramp to the south of the Benning Road bridge)

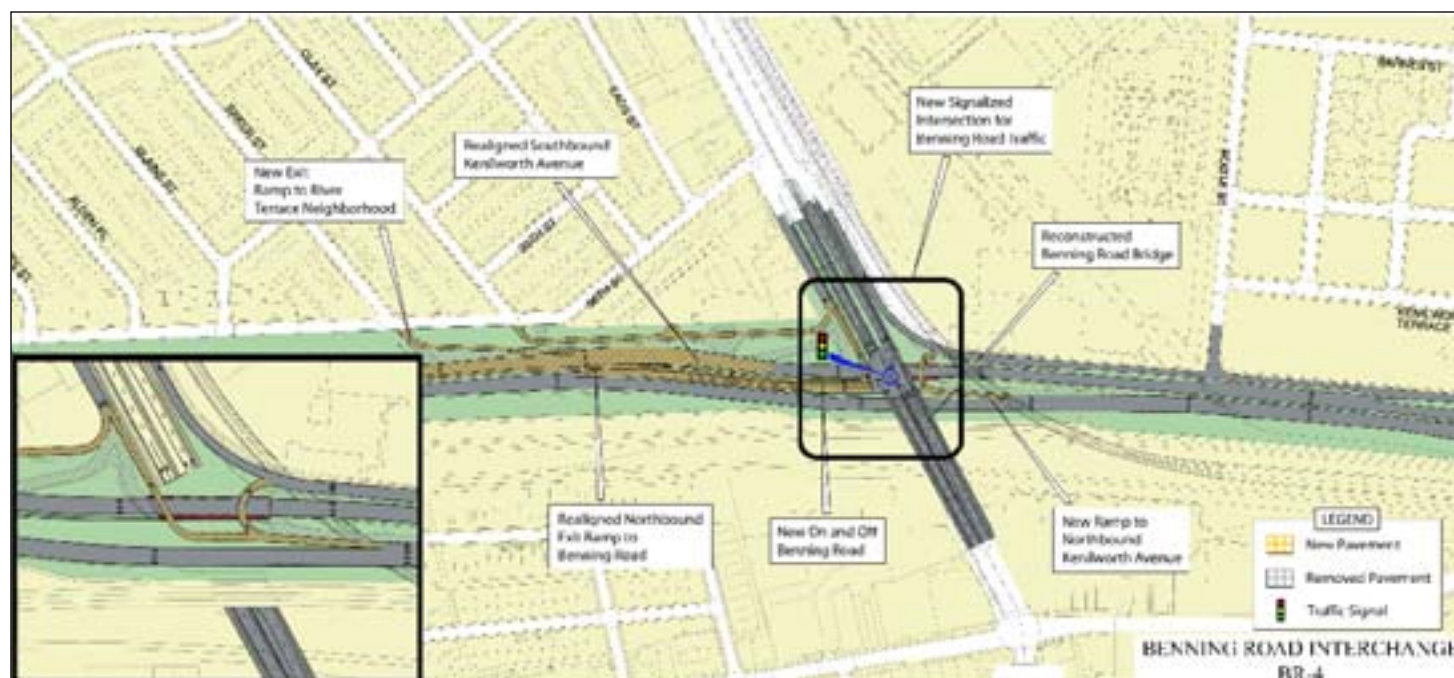


Figure 3.23: Scenario BR-4 (Benning Road Bridge reconstructed as a split structure to improve vehicular, pedestrian and bicycle safety)

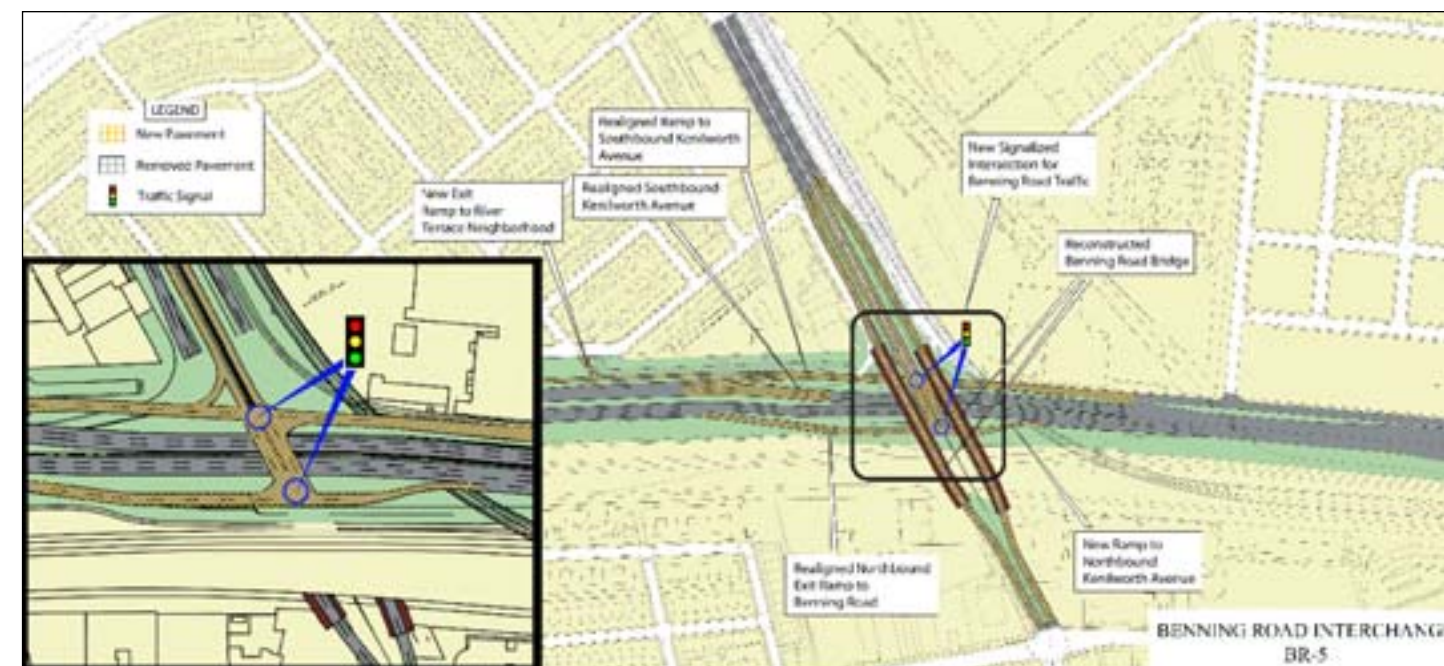


Figure 3.24: Scenario BR-5 (Allows for all movements through a new interchange located south of the existing bridge)

Safety improvements to the at-grade intersection of Benning Road and northbound Kenilworth Avenue are similar to those described in Scenario BR-1; however, the exit ramp from northbound Kenilworth Avenue is from the right lane rather than the left lane. This requires depressing the northbound lanes of Kenilworth Avenue. A traffic signal at the top of the ramp with Benning Road controls movement at the new intersection.

This concept does not add any new movements to the existing interchange; however, it makes major improvements to vehicle safety and to pedestrian and bicycle access to and across the Benning Road bridge.

Scenario BR-5

Scenario BR-5 provides for all currently missing movements at Benning Road and Kenilworth Avenue. This is accomplished by introducing a new interchange south of the existing Benning Road bridge. This new interchange is built over the depressed lanes

of southbound and northbound Kenilworth Avenue and makes a new connection to Benning Road west of the existing bridge. This new connection requires additional right-of-way, and calls for the acquisition of approximately 12 houses and commercial property in the southwest quadrant of the existing interchange (see Figure 3.24).

The new interchange allows movement from east- and westbound Benning Road to southbound and northbound Kenilworth Avenue. The existing at-grade intersection beneath the Benning Road bridge is no longer needed.

This scenario provides full movement between Benning Road and Kenilworth Avenue. Minor improvements in pedestrian and bicycle access to or across the Benning Road are made as the existing ramp movements are moved to signalized intersections.

3.6.4 Nannie Helen Burroughs Avenue Interchange

The reconstruction of the Nannie Helen Burroughs Avenue interchange (see Figure 3.25) includes the following improvements.

- Reconstructing the bridge providing a wider section for Nannie Helen Burroughs Avenue beneath Kenilworth Avenue that allows for an additional lane and wider sidewalks for pedestrians and bicyclist.
- Making safety improvements for the exit ramp to Nannie Helen Burroughs Avenue and reconfiguring the exit ramp and service road on southbound Kenilworth Avenue, north of Nannie Helen Burroughs Avenue.
- Eliminating the exit ramp immediately before Benning Road and reconfiguring the remaining on- and off-ramps to improve safety on southbound Kenilworth Avenue, south of Nannie Helen Burroughs Avenue.
- Signalizing the new ramp connection and service road where they intersect with Nannie Helen Burroughs Avenue, and providing traffic signal systemization along Nannie Helen Burroughs Avenue to Minnesota Avenue.
- Improving lighting along Kenilworth Avenue between Foote Street and Lane Place.

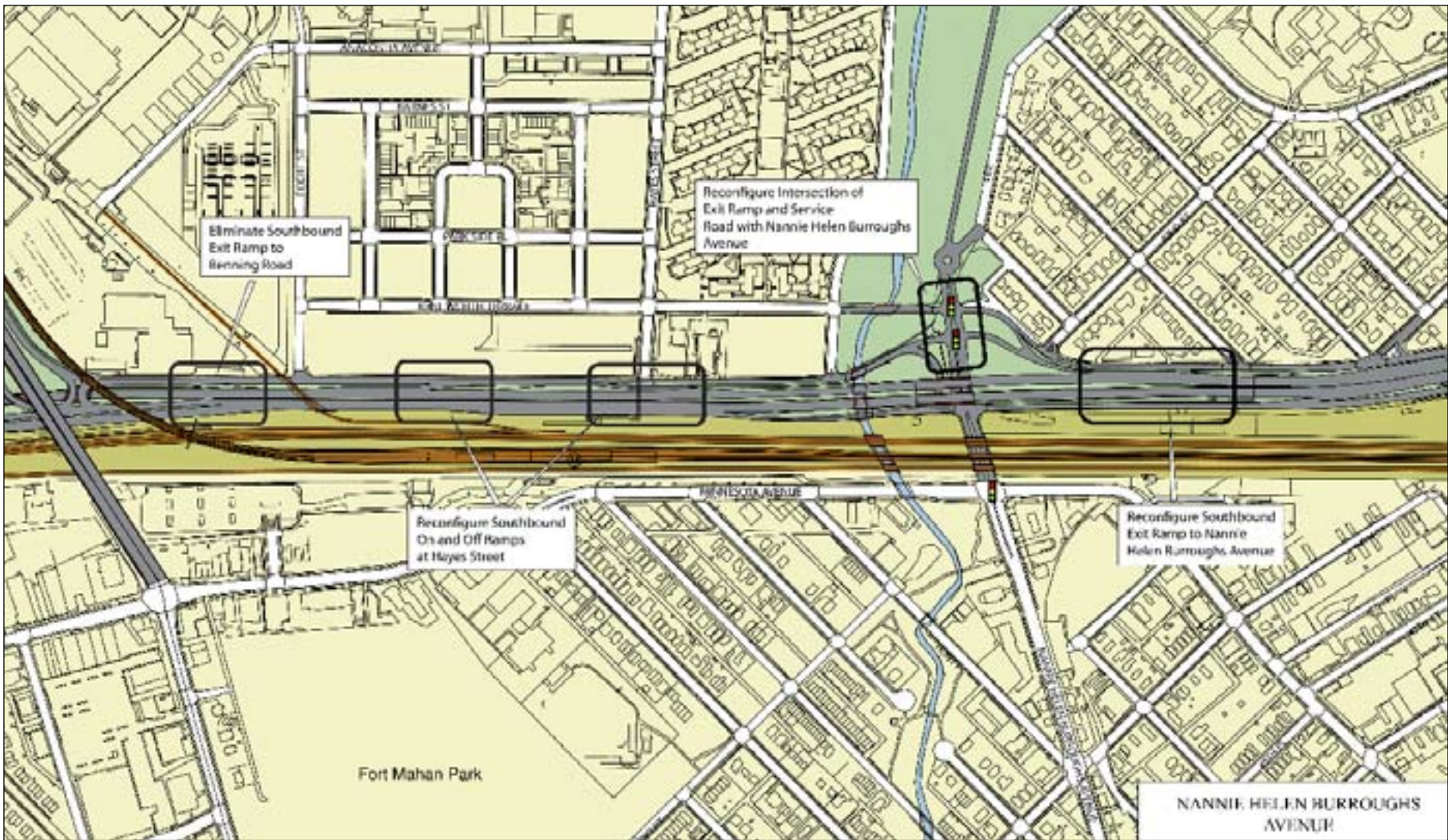


Figure 3.25: Proposed interchange at Nannie Helen Burroughs Avenue

3.6.5 Eastern Avenue Interchange

Two scenarios are considered for improving the gateway interchange at Eastern Avenue, the border between Washington, DC and Maryland. Important elements of each include:

- creating a visual gateway into Washington, DC for southbound drivers on Kenilworth Avenue;
- adding a connection between Anacostia Avenue and Eastern Avenue to provide a new link to Kenilworth Aquatic Gardens, Anacostia Park, and the waterfront;
- eliminating the existing U-turns; and
- redesigning the intersection to better accommodate pedestrian traffic.

Existing Conditions

A gateway portal to the District of Columbia, the Eastern Avenue interchange may be the first impression many visitors have of the city as they drive southbound to Kenilworth Avenue from the Baltimore-Washington Parkway. Eastern Avenue also provides access to the Deanwood Metrorail Station, the Kenilworth Aquatic Gardens, and the Kenilworth, Eastland Gardens and Deanwood neighborhoods. The interchange has three-legs with no western leg; it provides all movements including a U-turn for southbound and northbound traffic on Kenilworth Avenue (see Figure 3.26).

The primary limitation of the existing interchange is the poor pedestrian environment and lack of landscaping and streetscape features. Pedestrians are forced to cross the corridor on a narrow concrete median that separates the turning traffic on Eastern Avenue from the Kenilworth Avenue traffic using the U-turns.

The bridge itself is visually unappealing with a design that dates to the 1950s. Because of substandard clearances over Kenilworth Avenue, the Eastern Avenue bridge has been repeatedly hit by over-height vehicles.



Figure 3.26: Eastern Avenue Existing Conditions

Scenario EA-1

This scenario eliminates both U-turn ramps and reuses the space for landscape improvements, including new crosswalks and pedestrian-level lighting. Reconstruction of the bridge is not required (see Figure 3.27).

A new pedestrian/bicycle connection between the end of Anacostia Avenue and Eastern Avenue provides additional access to the Kenilworth Aquatic Gardens, the Anacostia Park, and the Anacostia waterfront for neighborhoods to the east of Kenilworth Avenue.

Scenario EA-2

This scenario maintains both U-turn ramps, but relocates them further from the intersection to provide space for pedestrian and landscape improvements, including pedestrian lighting. This scenario requires reconstruction of the bridge to create a wider bridge deck (see Figure 3.28).

As in Scenario EA-1, a new pedestrian/bicycle connection between the end of Anacostia Avenue and Eastern Avenue provides additional access to the Anacostia waterfront and the surrounding neighborhoods and attractions.



Figure 3.27: Scenario EA-1 (Existing U-turn ramps are removed and replaced with landscaped areas and improved pedestrian amenities)



Figure 3.28: Scenario EA-2 (U-turn ramps moved further out from the intersection)

3.6.6 Analysis of Option 3 for Year 2030

Travel demand analysis was performed using the MWCOG regional transportation model to project 2030 traffic volumes. Several scenarios for Option 3 were evaluated:

- No-Build (includes MAC improvements and refinements)
- Scenario S: No-Build + safety improvements
- Scenario 1: No-Build + full movement at East Capitol Street Interchange
- Scenario 2: No-Build + full movement at Benning Road Interchange
- Scenario 3: Maximum improvement including full movement at East Capitol Street and Benning Road, a new Massachusetts Avenue River Crossing, and a new Park Road between Barney Circle and Benning Road on the west side of the Anacostia River

A traffic analysis of year 2030 conditions found that demands on Kenilworth Avenue are growing as a result of traffic into and out of Maryland, and that under the various scenarios evaluated, operations will degrade substantially in the future. Implementing a full movement interchange at East Capitol Street provides the lowest increase in travel time throughout the corridor as demands to enter/exit Kenilworth Avenue become more dispersed. If the year 2030 traffic projections are realized and DDOT does not provide additional capacity on Kenilworth Avenue, DDOT must pursue travel demand management options to reduce peak hour traffic.

Programmed Capital Improvements

There are several programmed improvements within the study area that were included in the future condition analysis (year 2030). Each is described below.

- Nannie Helen Burroughs Avenue Interchange: The reconstruction of the Kenilworth Avenue bridge over Nannie Helen Burroughs Avenue is anticipated to be complete by 2009. These improvements are described in Section 3.6.4.

- Replacement of Kenilworth Avenue Bridge over AMTRAK and Beaver Dam Branch: The Maryland State Highway Administration will advertise a project to reconstruct the Kenilworth Avenue bridge over AMTRAK and Beaver Dam Branch immediately north of Eastern Avenue. Construction is expected to begin in 2006. As part of this project, the following improvements will be implemented: The existing bridges in both directions will be replaced, with the southbound structure widened; and an acceleration lane will be constructed for the eastbound New York Avenue to southbound Kenilworth Avenue ramp and extended to Eastern Avenue. This acceleration lane will improve operations along the ramp and improve queuing along eastbound New York Avenue.
- Minnesota Avenue: Minnesota Avenue terminates north of Nannie Helen Burroughs Avenue where it becomes Sheriff Road. A portion of Minnesota Avenue also exists between Meade Street and Eastern Avenue. The project connects these two pieces of Minnesota Avenue. There is no schedule for construction.
- Eastern Avenue Bridge Replacement: Design of the reconstruction of the Eastern Avenue bridge over Kenilworth Avenue is currently underway. As part of this improvement, the intersection will be replaced and upgraded for pedestrian and traffic safety improvements and Kenilworth Avenue lowered to improve vertical clearance beneath the new structure.

2030 Travel Demand Forecasting for Option 3

REGIONAL TRAVEL DEMAND MODEL

A travel demand analysis was performed for Option 3 using the Metropolitan Washington Council of Government (MWCOG) regional transportation model. The model is subdivided into about 2,900 Traffic Analysis Zones (TAZs), estimates the number trips between TAZs, and distributes the trips over the transportation network.

The analysis is a four-step process:

- Trip Generation – estimating the number of trips produced by and attracted to each TAZ;
- Trip Distribution – estimating the numbers of trips traveling between each TAZ;
- Mode Choice – splitting these trips into their respective modes of travel; and
- Network Assignment – assigning the generated trips to the transportation network and estimating the traffic volumes on network segments.

BASE YEAR (2004) MODEL VALIDATION AND ADJUSTMENT

To investigate the performance of the MWCOG model within the context of the study area, a base year (2004) model run was performed and validated against observed data. Validation of the base year model involved:

- Reviewing network coding in the study corridor;
- Examining zoning and land use data in the study area; and
- Comparing the traffic assignment results with observed traffic count data on major arterials.

Based on the validation of the base model results, a number of corrections and refinements were made to the model network. These included:

- Adding the service roads and the associated slip ramps on both sides of Kenilworth Avenue between Nannie Helen Burroughs Avenue and Eastern Avenue;
- Correcting turning movements at the Benning Road and East Capitol Street interchanges on Kenilworth Avenue to reflect actual conditions;

Improvement Scenario	AM Peak Hour		PM Peak Hour	
	Southbound	Northbound	Southbound	Northbound
Existing 2004 Condition	357	311	346	588
No-Build 2030	1,298	332	395	1,286
Option 3 + Scenario S	1,364	309	939	917
Option 3 + Scenario 1	1,268	311	667	732
Option 3 + Scenario 2	1,392	324	556	984
Option 3 + Scenario 3	1,500	328	490	822
Note: Travel Times measured in minutes.				

Table 3.5: Travel Times for the No-Build and Option 3 Scenarios

- Adding turn penalties for some movements at the intersection of Minnesota Avenue and Massachusetts Avenue; and
- Refining the network coding at the intersection of East Capitol Street and Minnesota Avenue.

In addition, the link attributes of some highway segments were adjusted to reflect the actual conditions as well as to obtain assignment results reasonably close to observed data.

TRAFFIC FORECASTS FOR 2030

In order to develop traffic forecasts consistent with the results from the Middle Anacostia River Crossing (MAC) Study, this study included the highway improvement proposed in the MAC Study including:

- 11th Street Bridge improvements;
- Barney Circle improvements; and
- Elimination of the Southeast-Southwest Freeway segment between the 11th Street Bridge and the John Phillip Sousa Bridge.

EVALUATION OF THE NO BUILD CONDITION

The No Build condition consists of the current geometry, including programmed roadway improvements. Analysis of the No Build condition aims to understand potential future operations if no other additional improvements are made by 2030.

SimTraffic was used to determine travel times and speeds throughout the corridor. Travel speeds are low and typically increase as vehicles travel through the corridor in the southbound direction. Travel speeds increase as vehicles travel north during the AM peak hour, however, the northbound movement is near gridlock between Pennsylvania Avenue and Benning Road during the PM peak hour.

LOS were also determined for the No Build condition. Without additional improvements, the majority of basic freeway, weaving and ramp segments operate at an unacceptable LOS F.

EVALUATION OF THE BUILD CONDITION

The Build Condition was analyzed using several variations in order to determine the best combination of improvements that might be implemented. The variants are based on the interchange layouts discussed above and consist of:

- Safety Improvements
- East Capitol Street Interchange Improvements
- Benning Road Interchange Improvements
- East Capitol Street and Benning Road Interchange Improvements

The Eastern Avenue Interchange was not included in the analysis as the proposed improvements for that interchange do not impact the traffic analysis.



As discussed above, for each interchange studied (East Capitol Street, Benning Road; and Eastern Avenue), multiple layouts were developed. For the analysis of the Build Condition, however, only the layout that provided full interchange movements was considered. This simplified the analysis and provided the worse-case condition for Year 2030. Each is described in more detail below.

SAFETY IMPROVEMENTS

Various safety improvements are incorporated into Option 3 throughout the corridor. These safety improvements do not involve any improvements to the interchanges that would add new movements. They consist of consolidating on- and off-ramps and providing adequate acceleration and deceleration distances for existing ramps to improve the safety for traffic entering and exiting Kenilworth Avenue (see Figure 3.29). For the Benning Road interchange, the analysis also considered right entrance/exits.

EAST CAPITOL STREET INTERCHANGE IMPROVEMENTS

These improvements incorporated a full-movement interchange at East Capitol Street. The full movement interchange is provided via right entrance and exit ramps.

BENNING ROAD INTERCHANGE IMPROVEMENTS

This improvement provides for a full-movement interchange at Benning Road. The full movement interchange is via right entrance and exit ramps.

EAST CAPITOL STREET AND BENNING ROAD INTERCHANGE IMPROVEMENTS

This improvement incorporates a full movement interchange at both East Capitol Street and Benning Road as discussed above.

The proposed safety and interchange improvements were coded in the model network and an analysis was performed, the results of which were compared to the No-Build Option.



Figure 3.29: Proposed Safety Improvements

3.6.7 Evaluation of Option 3 with Safety and Interchange Improvements

An analysis of the safety and interchange improvements was completed using SimTraffic. Table 3.5 compares the travel times under each combination of improvements evaluated.

There is no major reduction in travel time when implementing any of the combination of safety or interchange improvements as compared to the future No-Build condition. Travel times are high and speeds low throughout the corridor under all of the 2030 Build conditions.

A close analysis of the results indicates a preference for the full-movement interchange at East Capitol Street without any improvements at Benning Road. There is no appreciable difference in travel times between the future No Build condition and Option 3 built with the East Capitol Street Interchange improvement. However, that improvement combined with a full-movement interchange at Benning Road results in significant increases in travel time within the corridor.

Based on the Year 2030 analysis of the various improvements identified, operations will degrade substantially in the future. Implementing a full movement interchange at

East Capitol Street provides the lowest travel time throughout the corridor as demands to enter and exit Kenilworth Avenue become more dispersed.

If the year 2030 traffic projections are realized and additional capacity on Kenilworth Avenue is not provided, travel demand management options to reduce peak hour traffic volumes will be needed.

3.6.8 Traffic Management Alternatives

The analysis indicates that demand on Kenilworth Avenue is growing as a result of traffic into and out of Maryland. Coordination with the Maryland Department of Transportation and its various modal administrations should continue to pursue the following opportunities:

- Extend Metrorail and provide additional Metrorail parking capacity for rail lines into and out of Maryland;
- Coordinate with the Maryland State Highway Administration for the construction of additional park-and-ride lots and/or additional capacity at existing lots along US 50 and the Baltimore-Washington Parkway.
- Pursue potential commuter rail connections with existing MARC lines and/or new lines into Maryland.
- Consider re-constructing Kenilworth Avenue with a reversible lane system that would provide four lanes for the peak direction.
- Consider re-constructing Kenilworth Avenue and I-295 between both Maryland State lines to provide two lanes in each direction, as well as reversible managed lanes to encourage carpools and travel outside of the traditional peak hours.
- Implement High Occupancy Vehicle (HOV) lanes in one of the three lanes in the northbound and southbound directions.

The least expensive and most readily implemented travel demand management option is to designate one northbound and one southbound lane as High Occupancy Vehicle (HOV) lanes. Concurrent HOV lanes exist on several major arteries as well as several streets in the District of Columbia. Because of their widespread use in the area, HOV lanes can be implemented quickly on Kenilworth Avenue

with limited need for a public awareness or education campaign.

Implementation of HOV lanes on Kenilworth Avenue, however, will be challenging due to the absence of adjacent facilities to the north and south of the corridor. Complicating implementation of HOV on Kenilworth Avenue are frequent left and right entrance and exit ramps. In addition, HOV could not be supported on the reduced four-lane cross section south of East Capitol Street.

Two HOV options are feasible in the near-term:

- HOV Option 1, Left-Lane HOV: The left-most lane in both directions is converted to an HOV lane between Eastern Avenue and East Capitol Street. This configuration is typical of expressways or freeways, and could be striped with a wider lane line and/or with diamond pavement markings. Regulatory signs can be installed on the median barrier. Weaving from the HOV lane to certain exits may be a problem in certain directions due to the high peak hour volumes, such as the southbound exit to East Capitol Street (AM peak) and the northbound exit to eastbound US 50 (PM peak). The lack of shoulders would make enforcement challenging.
- HOV Option 2, Right-Lane HOV: The right-most lane is converted to HOV in both directions between Eastern Avenue and East Capitol Street. This configuration is not typical, but would simplify the weaving between the HOV lanes and key exits; however, more weaving may be introduced for traffic from on- and off-ramps which must make two lane changes to enter or exit Kenilworth Avenue.

HOV Option 1 provides the best operation. However, in order to eliminate the resultant weaving, directional ramps will have to be constructed. Reconstructing Kenilworth Avenue with a reversible HOV lane system that provides up to four lanes for the peak

direction along the entire corridor is another possibility. A five-lane section would provide three lanes in the peak direction.

It may be worthwhile to consider re-constructing Kenilworth Avenue and I-295 between both Maryland State lines to provide HOV lanes for the entire corridor. This would require additional capacity in both directions of I-295. Since the Maryland State Highway Administration and the Virginia Department of Transportation are both investigating the use of managed lanes, DDOT could also consider reversible managed lanes to encourage carpools and travel outside of the traditional peak hours.

3.6.9 ITS Alternatives

There are a number of ITS (Intelligent Transportation System) initiatives that DDOT is implementing throughout the city. Several of these should be considered for the Kenilworth Avenue corridor as they have the potential for improving traffic operations and providing useful information to travelers. These alternatives are discussed below. It should be noted that these alternatives are not exclusive and may be combined with any of the projects planned for short-, near- and long-term implementation.

- Dynamic Message System (DMS): A permanent Dynamic Message system should be considered for the corridor that would extend to points north and south in order to provide adequate real-time information for travelers. A DMS, used in conjunction with a Highway Advisory Radio System, would greatly enhance capabilities for communicating with the traveling public and provide information related to incidents (crashes), construction activities, congestion, travel times, and road conditions.
- Highway Advisory Radio (HAR): Highway Advisory Radio transmitters currently have limited use in the city. Given the critical aspect of this corridor as a commuter route and the high incidence crashes that occur (in some locations up to three times the national average), a dedicated HAR system for this corridor should be implemented and extended into Maryland along the BW Parkway, New York Avenue and Route 50. A dedicated HAR would provide travelers with incident information and construction-related impacts.
- Closed-Circuit Television (CCTV) System: A CCTV system installed along the corridor would provide real-time information on traffic conditions and aid in incident management. Currently, CCTV is installed at major signalized intersections on either side of the corridor but none are oriented along the Kenilworth Avenue mainline.

- Road Weather Information System (RWIS): This provides critical information regarding real-time road temperatures and is useful during cold weather months for anticipating freezing conditions that lead to ice accumulation on bridges and roadway pavement. This system should be used in conjunction with a HAR and DMS to convey information to travelers.
- SpeedInfo Speed Sensor System: SpeedInfo provides real-time information on traffic speeds. As a supplement to a CCTV system, SpeedInfo can provide data over a navigation system, cell phone, HD radio, satellite radio, or on the web.



3.7 Additional Study Areas

In addition, to the interchange improvements discussed above, two additional improvements within the corridor were studied and analyzed.

- a new Park Road between Barney Circle and Benning Road on the west side of the Anacostia River; and
- a new Massachusetts Avenue crossing of the Anacostia River.

3.7.1 A New Park Road

In keeping with the Anacostia Framework Plan and the intent of unifying the many parks and recreational areas along the Anacostia River, a Park Road is proposed that links major destinations and neighborhoods from Eastern Avenue with points south.

The Park Road will connect all of the waterfront’s major destinations: the National Arboretum, Kenilworth Aquatic Gardens, RFK Stadium, Hill East Meadows, the Kingman Island Nature Center, the new Recreation Center in Twining Park, the playing fields in the Fairlawn section of the Anacostia Park, and the Poplar Point Cultural Park. The Park Road will be twenty feet wide, with parallel parking lanes along selected portions.

This is a park-type road, not a commuter road, intended to enhance access to parkland and the river front. Within the context of the Kenilworth Avenue Corridor Study, three areas were studied and options developed to address linkages and missing connections.

Anacostia Avenue to Eastern Avenue Connection

A new connection between the terminus of existing Anacostia Avenue and Eastern Avenue is built, providing a new access point to the park for pedestrians, bicyclists and vehicles. This new connection completes the Eastern Avenue intersection, creates a new entrance to Kenilworth Aquatic Gardens, and provides an opportunity to define a gateway to the city. It is also the northernmost gateway to a new Park Road, a contiguous route through the park to points south.

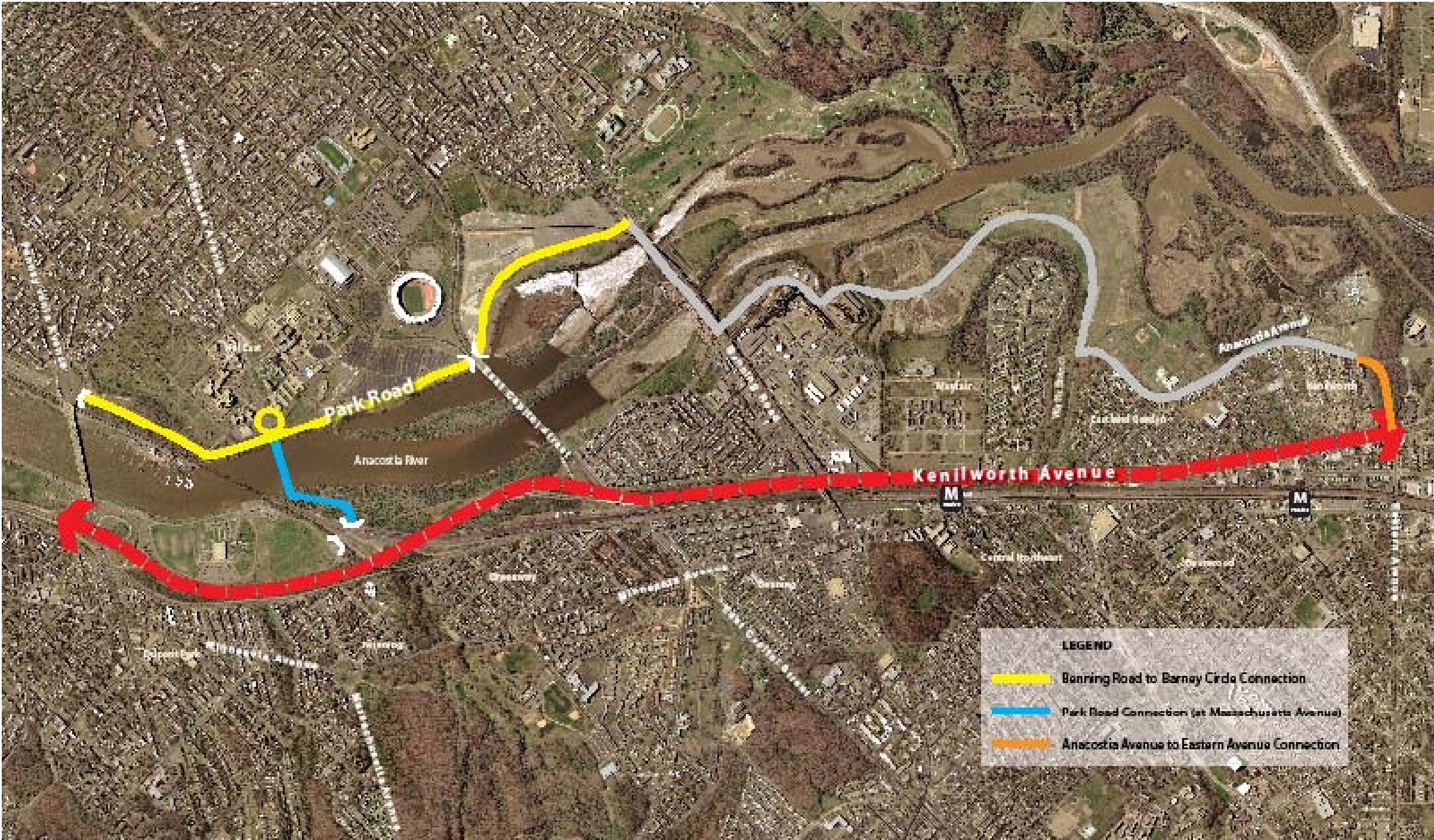


Figure 3.30: Park Road Alignment

Benning Road to Barney Circle Connection

To continue Park Road, a new connection is proposed at Benning Road on the west bank that follows the river to the proposed Reservation 13 Circle and continues to Barney Circle. This new connection provides access to the west bank park for pedestrians and vehicles, and a continuation of the road through the park.

Park Road Connection (at Massachusetts Avenue)

The new Park Road makes a connection across the river to join the segment from Benning Road and Barney Circle on the west bank with the parkland on the east bank.

The new connection, the proposed Massachusetts Avenue Park Road bridge, connects the proposed and existing Park Road system but does not connect to local streets. It serves as a connection for pedestrians, bicyclists, and vehicles using the new Park Road. This would also provide access for National Park Service maintenance vehicles.

3.7.2 Analysis of Park Road Options

The three options for Park Road are not mutually exclusive. Each of these options may be implemented independently of the other with the goal that a new Park Road link major destinations and neighborhoods from Eastern Avenue with points south. The basis for this evaluation is discussed below.

Urban Design

All three options establish new connections. The most important connections are created by the Anacostia Avenue to Eastern Avenue connection and the Park Road connection.

The Anacostia Avenue to Eastern Avenue connection completes the fourth leg of the interchange at Eastern Avenue and provides for a new entrance to Kenilworth Aquatic Gardens and the opportunity to create a true gateway setting for the city.

The Benning Road to Barney Circle connection, at Benning Road, creates a less prominent connection to the waterfront that is more functional in purpose.

While all three options contribute to establishing an enhanced street grid, the Park Road connection (at Massachusetts Avenue) is rated higher in this regard as it extends a significant avenue, that currently lacks continuity both visually and physically. This option is also rated higher for both the experience it provides to pedestrians and bicyclist using the facility and for the connectivity it provides between two neighborhoods.

Land Use

The Anacostia Avenue to Eastern Avenue connection enhances connectivity between neighborhoods and completes the fourth leg of an important intersection in the city. Surrounding land use would be enhanced by this option, particularly given the proximity of the Deanwood Metrorail Station. The other two connections have no significant impact on surrounding land use.

Pedestrian/Bicycle Conditions

The quality of existing pedestrian and bicycle conditions improves under all options, primarily because of the creation of new connections.

The Benning Road to Barney Circle connection and the Park Road connection (at Massachusetts Avenue) are rated higher than the Eastern Avenue connection owing to the direct connection to parkland. These two connections are also rated higher for the experience they provide to pedestrians and bicyclist using the facility, with the Benning Road to Barney Circle connection better in this respect than the Park Road connection (at Massachusetts Avenue). All options reduce the number of conflicts with vehicles.

Compatibility with Great Streets

None of the options make a gesture to, or detract from, the Great Streets Initiative.

Connectivity to Neighborhoods

All options enhance connectivity to neighborhoods. All three provide access between neighborhoods for pedestrians and bicyclists, with the Eastern Avenue connection being slightly better owing to the direct connection provided. The other two options enhance connectivity to open space.

Access to River

All options enhance access to the Anacostia River for pedestrians, and bicyclists.

Access to Transit

Access to transit facilities and transit routes for vehicles, pedestrians, bicyclists, and transit users is unchanged in each of the three options.

Traffic

None of the options affects traffic in any significant way.

Safety

Traffic safety remains unchanged under all three options.

Construction Costs

In gross order of magnitude, the Eastern Avenue connection is the least expensive to

implement. The Benning Road to Barney Circle connection and the Park Road connection (at Massachusetts Avenue) are more expensive as they require construction of significant infrastructure.

Construction Impacts

The Eastern Avenue connection potentially impacts designated wetlands and possibly requires occupying parkland.

The Benning Road to Barney Circle connection and the Park Road connection (at Massachusetts Avenue) require occupying parkland, with the latter having an impact within the Anacostia River.

Potential Environmental Impacts

The Eastern Avenue connection may have significant impacts on designated wetlands and requires careful design to minimize such impacts. It might also reduce parkland and open space and may affect natural resources, land uses and neighborhood character. Community services, such as fire and police response, are not affected.

The Benning Road to Barney Circle connection and the Park Road connection (at Massachusetts Avenue) occur directly in parkland and open space but are intended to enhance park access. They may affect natural resources. Community services, such as fire and police response, remain unchanged under these options.

All options have minimal impact on community and recreational facilities, and on historic and cultural resources.

Both the National Park Service and the neighboring community have expressed concern that any of these options may have adverse impacts on accessibility to the park and the potential for increased commuter traffic.

Recommendations

A vehicle connection between Anacostia Avenue and Eastern Avenue is problematic due to the presence of designated wetlands west of the Eastern Avenue intersection.

However, a pedestrian or bicycle connection at this location greatly enhances connectivity for park users and those wishing to access the Deanwood Metrorail Station. Options for making a multi-use trail connection between Anacostia Avenue and Eastern Avenue, that is sensitive to the natural environment, could be explored further.

The Benning Road to Barney Circle connection enhances access on the west bank of the Anacostia River, and, in conjunction with the Park Road connection (at Massachusetts Avenue), provides continuity to the existing Park Road system. The Park Road connection (at Massachusetts Avenue), which provides a new connection for pedestrians and bicyclists and a limited connection for vehicles using the park, together with the Benning Road to Barney Circle connection, could be studied further because of this improved connectivity.

Any of these options will only be possible with support and approval of the National Park Service which has jurisdiction over the land required to make the access improvements.



3.7.3 A New Massachusetts Avenue Crossing

Massachusetts Avenue is a grand boulevard that is interrupted by Reservation 13 prior to the Anacostia River in Ward 6, and by the CSX railroad spur and Kenilworth Avenue in Ward 7.

Due in part to the historical location of the D.C. General Hospital and the District Jail at Reservation 13, Massachusetts Avenue has long terminated at 19th Street. A preliminary study of this area, now referred to as the Hill East waterfront, recommends extending a neighborhood-scale street grid to the Anacostia River and creating a vibrant, mixed-use waterfront neighborhood. Massachusetts Avenue will provide a vital lifeline to this new mixed-use development, the success of which depends on strong connections to the rest of the city.

The extension of Massachusetts Avenue across the river via Park Road bridge can provide an excellent pedestrian and bicycle route between parks and neighborhoods on both sides of the river. According to the Hill East plan, Massachusetts Avenue will extend through the site to end in a traffic circle at the waterfront, connecting to the Park Road system. From there, travelers along the Riverwalk or the Park Road will have the option of heading southwest towards the Near Southeast neighborhoods and more urban portions of the waterfront, northeast towards the upper reaches of the Anacostia River, or across the river on the new Massachusetts Avenue Park Road bridge.

The proposed Massachusetts Avenue Park Road bridge will create a much needed connection across the river for pedestrians and cyclists who seek to travel through the park system on either bank of the river. This study explores three options that either physically, or symbolically, connect the two end of Massachusetts Avenue.

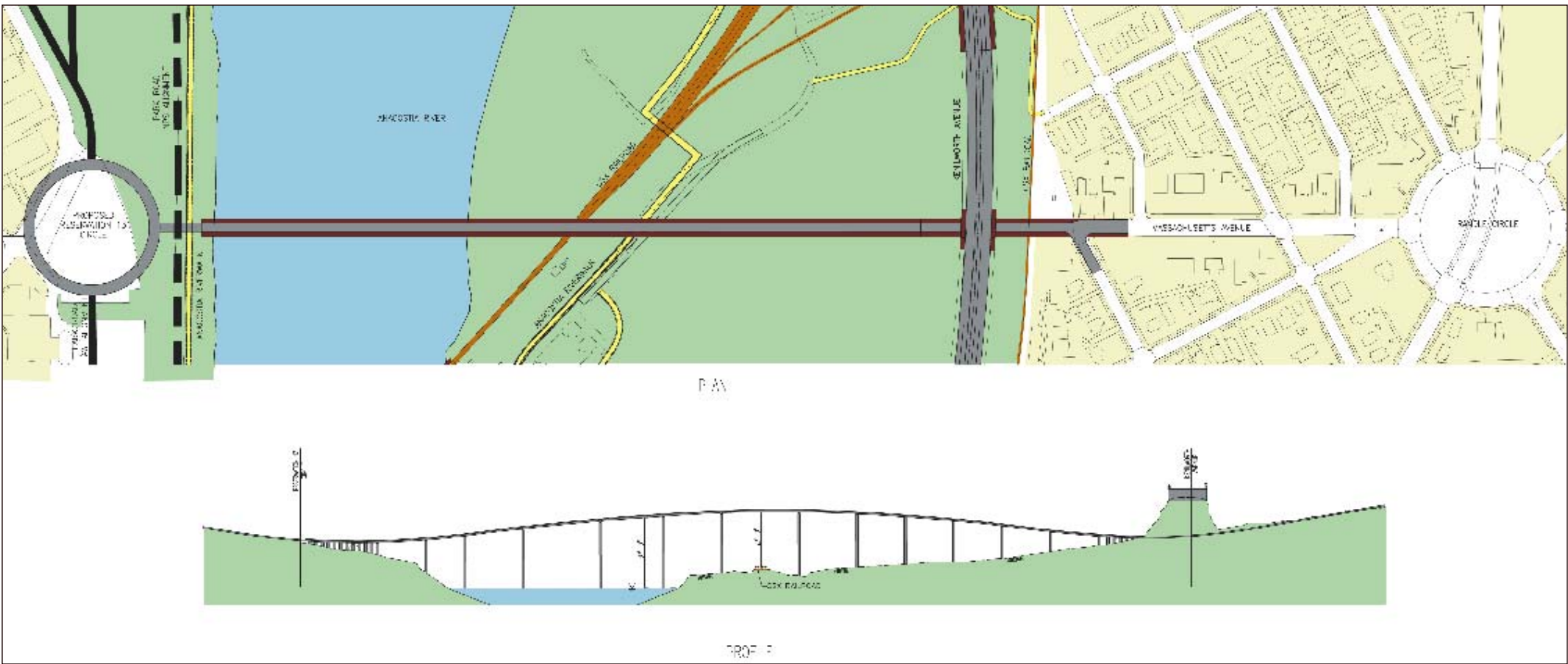


Figure 3.31: Reservation 13 to Randle Circle Connection

- Under one option, a two-lane bridge connects Reservation 13 in Ward 6 to Randle Circle in Ward 7;
- Under another, a pedestrian and bicycle crossing, aligned with Massachusetts Avenue, connects the two waterfront parks on either bank of the Anacostia River; and
- Finally, a two-lane vehicular, pedestrian and bicycle crossing was considered that connects the two waterfront parks on either bank of the Anacostia River.

Reservation 13 to Randle Circle Connection

Under this option, a new bridge connects Massachusetts Avenue at Reservation 13 in Ward 6 with Massachusetts Avenue at Randle Circle in Ward 7. This bridge spans the Anacostia River, the parkland on either bank,

the CSX Railroad tracks on the east bank, and Kenilworth Avenue (see Figure 3.31).

This bridge provides the required vertical clearances over the railroad tracks. Under this option, there is no connection to Kenilworth Avenue as the purpose of this option is primarily to serve local traffic.

Park-to-Park Pedestrian Connection

This option provides a new connection across the Anacostia River that is restricted to pedestrians and bicyclists. It is aligned with Massachusetts Avenue and connects the federal parkland on either bank of the Anacostia River.

Open space connectivity is enhanced due to new connections to existing or proposed trails for pedestrians and bicyclists. National Park Service vehicle could use the bridge for main-

tenance purposes. There is no public vehicular connection to local streets (Figure 3.32).

Park Road Connection

The Anacostia Waterfront Initiative Framework Plan proposes a new Park Road that crosses the Anacostia River at Massachusetts Avenue. As described in the Framework Plan, a new Massachusetts Avenue would extend through proposed redevelopment at the Reservation 13 site to end in a traffic circle at the waterfront.

The proposed Massachusetts Avenue crossing connects to the proposed and existing Park Road system only, and not to local streets, thus preventing regional traffic from using the bridge as a shortcut. The bridge would also serve as a connection for pedestrians and bicyclists and for National Park Service maintenance vehicles.

3.7.4 Analysis of Massachusetts Avenue Crossing Options

The three options for a new Massachusetts Avenue crossing of the Anacostia River were evaluated as discussed below.

Urban Design

Due to the need to span across Kenilworth Avenue and the CSX railroad tracks, a bridge as described in the Reservation 13 to Randle Circle connection establishes a substantial presence along the waterfront. This is a deviation from existing bridges that cross the Anacostia River within the District of Columbia. This option also creates a substantial barrier at the eastern end, where the bridge connects to Massachusetts Avenue in the Randle Circle neighborhood.

By comparison, the bridges in the Park-to-Park Pedestrian connection and the Park Road connection only connect the existing banks of the Anacostia River. A bridge under these options could be designed to fit into the typology established by existing river crossings.

Land Use

The bridge considered under the Reservation 13 to Randle Circle connection would include structural elements, such as support piers, that could have a significant impact on existing parkland. The bridge and a new road connection creates a through connection in a location where the avenue currently dead-ends and increases traffic in the Randle Circle neighborhood.

The Park-to-Park Pedestrian connection and the Park Road connection are not anticipated to result in a significant impact on surrounding land uses.

Pedestrian/Bicycle Connectivity

All options improve the quality of pedestrian and bicycle connections, and create a new connection across the river.

The Park-to-Park Pedestrian connection and the Park Road connection provide a direct connection between parkland on either bank of the river. The Reservation 13 to Randle Circle connection provides a connection between neighborhoods along Massachusetts Avenue on either side of the river, but not between the waterfront parks.

The experience of pedestrians and bicyclists is anticipated to be best under the Park-to-Park Pedestrian connection, where the crossing is designed specifically for them. Under the Park Road connection, the connection is designed for low speed and single lane vehicular traffic, as well as for pedestrians and bicyclists. This connection is also anticipated to provide a positive experience for pedestrians and bicyclists. Both the Park-to-Park Pedestrian connection and the Park Road connection reduce the number of conflicts with vehicles relative to the Reservation 13 to Randle Circle connection.



Figure 3.32: Park-to-Park Connection

Vehicular Movement and Connectivity

The Reservation 13 to Randle Circle connection enhances vehicular connectivity between neighborhoods across the Anacostia River. This is not the case under the Park-to-Park Pedestrian connection and the Park Road connection, since access is limited between the waterfront parks.

Under the Reservation 13 to Randle Circle connection, new traffic movements are added; however, Level of Service measurements at key intersections are expected to deteriorate on both approaches to the bridge, partially negating this enhancement. The Park-to-Park Pedestrian connection and the Park Road connection do not provide for any significant new traffic movements.

Construction Costs and Impacts

In gross order of magnitude, the Reservation 13 to Randle Circle connection results in a substantial bridge structure and is the most expensive to implement. The Park-to-Park

Pedestrian connection, which consists of a shorter pedestrian bridge, is the least expensive. The Park Road connection, is designed to carry two lanes of park traffic, is moderately expensive.

The Reservation 13 to Randle Circle connection results in the most construction-related impact, since it can only be implemented by occupying parkland and taking property in the Randle Circle neighborhood. The Park-to-Park Pedestrian connection and the Park Road connection have relatively minimal construction impacts; however, parkland will be required to build both structures.

Potential Environmental Impacts

The Reservation 13 to Randle Circle connection significantly affects parkland and open space, and may have an impact on natural resources, land uses, and neighborhood characteristics. Community services, such as fire and police response, are enhanced owing to a new connection across the river.

The Park-to-Park Pedestrian connection and the Park Road connection have minimal impact on parkland and open space; however, there may be an impact on natural resources due to new construction. No impacts on land uses and neighborhood characteristics are expected. Community services, such as fire and police response, are anticipated to be unaffected.

All options are anticipated to have minimal impact on community and recreational facilities, and historic and cultural resources.

The Reservation 13 to Randle Circle connection may impact air quality and noise. This would occur to a lesser extent under the Park-to-Park Pedestrian connection and the Park Road connection.

Recommendations

Both the Park-to-Park Pedestrian connection and the Park Road connection, where a new connection for pedestrians and bicyclists, and a limited connection for vehicles (under the Reservation 13 to Randle Circle connection) should be studied further because they improve connectivity between communities and the waterfront.

The Reservation 13 to Randle Circle connection should be eliminated from further consideration because it would likely result in negative affects on the viewshed and adjacent neighborhoods.

The construction of the proposed Massachusetts Avenue Park Road bridge could only be possible with support and approval of the National Park Service which owns or has jurisdiction over the land required to build the crossing.